American Aviation

MANAGEMENT
ENGINEERING
PRODUCTION
OPERATIONS
MAINTENANCE
EQUIPMENT

AUGUST 17

1953

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The Navy looks to the future

One look at the Convair Sea Dart and you know you're seeing something new in seaplanes.

Her unusual lines, delta-wing and hydro-skis (a "first") all point to the fact that she was designed to give high speed land plane performance plus the mobility of a water based aircraft.

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New Joint Chiefs of Staff take over officially this week. They've been examining overall defense picture, now have less than 90 days to come up with firm recommendations. Size of fiscal 1955's defense budget presumably depends on their findings. There's speculation, incidentally, that JCS will base Air Force's size on overall number of planes instead of wings.

Next AF budget may be more than $11.2 billion just voted for fiscal 1954. Defense Secretary Wilson said planes deferred in '54 would have to be ordered later. Big budget request, however, will run into trouble, with Congress in an election year.

• •

Military plane and engine production is at or near its peak. Manufacturers' six-months' financial reports show sales and profits up substantially—some of them double last year. Production is scheduled to remain at peak level into next year.

You can discount recent Bureau of Labor Statistics monthly report that aircraft industry employment has dropped. Figures reflected prolonged strikes in engine plants—employes out for a month weren't counted. Employment isn't trending downward yet.

• •

Cuts in research and development work may hit manufacturers soon. Congress voted $440 million for Air Force R&D (against $537 million asked by Truman, $475 million by Eisenhower). So far, only 75% of this ($330 million) is scheduled to be spent this fiscal year, although Defense Department may eventually release the remainder. McDonnell Aircraft has already warned employes that company's R&D cutback may reach several million dollars.

Navy contractors are hardest hit. U. S. Air Force has long buried R&D money in procurement funds where it was less apt to be cut back. Navy maintained policy of keeping all R&D funds in the legal bookkeeping columns. Defense Department R&D cuts hardly touched aircraft industry work for USAF but Navy contractors were cut drastically.

Canadians may still build a jet transport. A. V. Roe Canada is definitely interested in marketing its "Jetliner." One plane was built four years ago; project was sidetracked for military work, which has now slackened.

With bigger engines (possibility: J65, built by Curtiss-Wright under license) the Jetliner would be suitable for U. S. routes and could be produced before U. S. jets.

• •

Look for European airlines, led by SAS, to increase intra-Europe first-class service this winter. Almost all flights have been tourist. Former first-class customers, largely businessmen, have returned to trains rather than ride tourist.

• •

Key to military airlift as a normal means of supply in times of mobilization and war is a big turboprop-powered transport, larger than types now programmed, according to the confidential Rand Report.

USAF is now disclosing the findings of the report, made by the Rand Corporation, to selected airline and manufacturing leaders, using CAA as the intermediary. Move may set trend to share valuable military studies with legitimate civil interests.

Don't discount the turbojet-powered transport's role among U. S. operators. Turboprop enthusiasm, at an all-time high two months ago, is already dwindling. Situation is so volatile one manufacturer's representative abroad changed sales pitch in the middle of his presentation after talks with home office.

The Washington View

Join the Navy, See Defense

Now that Defense Secretary Charles Wilson has just about completed the selection of his top "team" of lieutenants, it is readily apparent that his recruiting of talent has run heavily to Navy types. Heading the list of those with Navy backgrounds in the new Defense Department secretariat is, of course, W. J. McNeil, assistant secretary-comptroller, who holds the rank of admiral in the Naval Reserve. It was "Admiral" McNeil, the Air Force claims, who was responsible for the recently approved budget in which Air Force funds were "severely slashed." Close to McNeil and also his deputy is another former Navy officer, Lyle S. Garlock.

Other members of Wilson's "inner circle" who previously have served the Navy are Frank Nash and Charles S. Thomas, assistant secretaries, and H. Struve Hensel, general counsel. Nash is a holdover from the Truman administration, as is McNeil. Thomas just assumed his new post in a shift from Under Secretary of Navy. Hensel, who is on the assistant secretaryship level, was at one time Navy general counsel and later became an assistant secretary in 1945-6.

To fill the one remaining vacancy, that of assistant secretary for legislative affairs, Wilson is reportedly considering Harry L. Towe, former Republican Congressman from New Jersey, for the spot. In some quarters, Towe's appointment would be considered a natural, he attended the Naval Academy.

By contrast, Wilson has not chosen a single Air Force type to join his Department's hierarchy.

Footnote: The Navy sentiment must be pretty strong with Wilson & Company. Although both Air Force and Naval air transport services are used, a special Navy crew is said to be personally assigned to Wilson. Recently on weekend trips home, the Defense Secretary and his deputy, Roger Kyes, have stowed their golf clubs in a plush Navy Super DC-3 for the flight to Detroit.

The Battle Still Goes On

The fight over the Administration's cuts in Air Force money continues unabated, although the budget battle for this year has been completed. Latest in a series of moves taken on either side of what has become a political issue:

• **Preparation** of an eight-page brief by the Senate GOP Policy Committee staff which provides for Republican Senators ready-made answers to Democratic critics. The document knocks any claim that the Democrats are the main proponents of adequate air power, noting that the Republican members of Congress have always favored a strong Air Force. It contends that "during the Truman administration, Republicans fought steadily to build air power and opposed Democratic measures to cut plane strength drastically."

• **A resolution** introduced in the House by Rep. Samuel W. Yorty (D., Cal.) which would authorize the Armed Services Committee to conduct a full and complete investigation of reprisals which may have been taken against members of the Air Force because of certain testimony given at Air Force budget hearings. Defense Secretary Wilson and others had assured Congress that no action would be taken against them because of their views.

• **Rep. Yorty has also charged** that Republican Congressmen are preparing an "insidiously clever" television program to "try to sell the American people a bill of goods" on the Air Force cuts. He claimed a script, full of "misleading propaganda" and "brazen hypocrisy," was prepared by the GOP Congressional Committee, but Rep. Richard M. Simpson (R., Pa.), Committee chairman, denied any knowledge whatever of the idea.

A Look at the Record

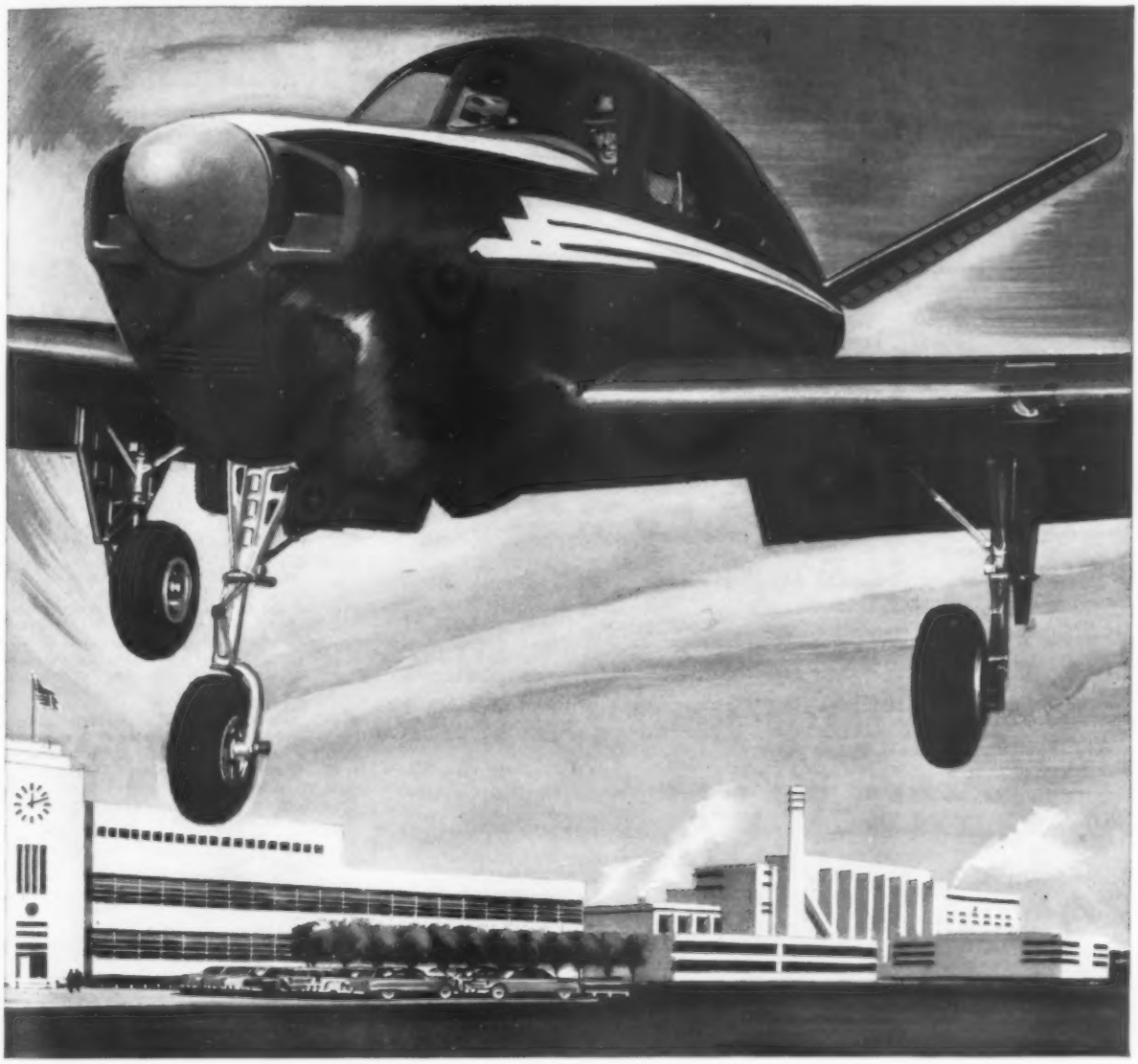
It was a very unimpressive record achieved by the 83d Congress on aviation bills by the time the first session was adjourned this month. There was little or no affirmative action on measures having a direct bearing on aviation, aside from such aviation matters as are affected by the customary appropriations bills.

The greater number of the aviation legislative proposals dropped in the "hoppers" during the past six months were not finally acted upon, and therefore must carry over for possible further action when Congress reconvenes next January 6. It is possible that new pressures for enactment of certain of these measures will be exerted then.

Press Program Set

It now looks as if the Air Force has finally decided the status of four planned extrusion presses under a "re-revised" press program in which the Air Force will pay for the buildings to house them. Kaiser Aluminum & Chemical Co.'s plant at Halethorpe, Md., is assured of getting one 8,000-ton press and probably will get another, with Harvey Machine Co.'s facility at Torrance, Calif., probably to get a 12,000 tonner and an 8,000 tonner. This decision may mean complete elimination of Reynolds Metal Co., which had been set to operate one 8,000- and one 12,000-ton press after the Air Force cutback.

. . . Preble Staver



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OTHER PUBLICATIONS . . .

American Aviation Daily, a daily news service for the entire industry. $200 per year. Managing Editor: Keith Saunders.

American Aviation Directory; twice yearly listing of products, people and organizations. $7.50 each. Managing Editor: Marion E. Grambow.

Official Airline Guide: Monthly publication of airline schedules and fares. $11 per year in USA and countries belonging to Pan American Postal Union, including Spain and the Philippines. $12.50 elsewhere. Published from 139 N. Clark St., Chicago 2, Ill. Central 6-5804. Managing Editor: Robert Parrish.

American Aviation Traffic News (incorporating Air Tariff Reports): Daily rates and tariff news. $150 per year. Managing Editor: Wallace I. Longstreth.

Where & When

Aug. 19-21—Western Electronics Show & Convention, Municipal Auditorium, San Francisco. Sponsored by IRE 7th Region and WCEMA.

Aug. 20-23—Air Force Assn., 7th Annual National Convention, Statler Hotel, Washington, D. C.

Aug. 27-29—Institute of Navigation, Annual Meeting, Coast Guard Academy, New London, Conn.

Sept. 5-7—National Aircraft Show & 50th Anniversary of Powered Flight, Dayton, Ohio.

Sept. 8-10—ATA, Agency Committee, Allison Hotel, Miami Beach, Fla.

Sept. 9-11—Air Safety Seminar, Flight Safety Foundation, probable location, Luxembourg.

Sept. 21-25—Instrument Society of America, 8th National Instrument Conference & Exhibit, Chicago.

Sept. 22-24—Aircraft Spark Plug & Ignition Conf., Champion Spark Plug Co Toledo, Ohio.

Sept. 24-25—Radio Technical Commission for Aeronautics, Fall Assembly, Sheraton Park Hotel, Washington, D. C.

Sept. 27-29—Int'l Northwest Aviation Council, 17th Annual Conference, Gearhart, Oregon.

Sept. 28-30—National Electronics Conference, 9th Annual Meeting, Hotel Sherman, Chicago.

Sept. 29-Oct. 3—SAE, Aeronautic Meeting & Aircraft Engineering Display, & Aircraft Production, Hotel Statler, Los Angeles.

Sept. 30-Oct. 1—AIEE, Aircraft Electric Equipment Conference, Seattle.

Oct. 1-3—Air Reserve Assn., Annual Meeting, Angebilt Hotel, Orlando, Fla.

Oct. 10-17—5th Annual All-Texas Air Tour Information from Texas Aeronautics Commission, Walton Bldg., Austin.

Oct. 13-15—Air Transport Association, Annual Engineering & Maintenance Conf., Saxony Hotel, Miami Beach, Fla.

Oct. 14-15—New York State Dept. of Commerce, Annual Airport Development & Operation Conference, Onondaga Hotel, Syracuse.

Oct. 19-22—ATA, Purchasing Committee, Saxony Hotel, Miami Beach, Fla.

Oct. 28-30—Southeastern Airport Managers Association, Annual Convention, Marlin Beach Hotel, Fort Lauderdale, Fla.

Oct. 29-30—National Business Aircraft Assn. (formerly CAOA), 6th Annual Forum & Meeting, Park Plaza Hotel, St. Louis, Mo.

Nov. 3-4—Transport Aircraft Hydraulic Conference, sponsored by Vickers, Inc., Park Shelton Hotel, Detroit, Mich.

Nov. 3-6—National Association of State Aviation Officials, Annual Meeting, Edgewater Gulf Hotel, Edgewater Park, Miss.

Nov. 5-6—SAE, Fuels & Lubricants Meeting, Conrad Hilton Hotel, Chicago.

Nov. 16-17—American Society for Quality Control, Aircraft Quality Control Conf., Biltmore Hotel, Dayton, O.

Dec. 3-5—7th annual Arizona Aviation Conference, Yuma, Ariz.

Dec. 17—17th Wright Brothers Lecture (sponsored by IAS), U. S. Chamber of Commerce Auditorium, Washington, D. C.

INTERNATIONAL

Aug. 25—ICAO Legal Committee, Rio de Janeiro

Sept. 7-13—SBAC Aircraft Show & Flying Display, Farnborough, England.

Sept. 7-18—IAS-RAES, 4th Int'l Conference, London, England.

Oct. 5-10—IATA Annual Assembly, Montreal, Canada.

Oct. 10—International Air Race, England to Christchurch, N. Z.

Nov. 1-22—IATA, Traffic Conferences, Honolulu.

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Letters

Letters should be addressed to The Editor, American Aviation Magazine, 1025 Vermont Ave., N.W., Washington 5, D. C. Anonymous letters will not be printed, but names will be withheld upon request.

DANGER AT GANDER

To the Editor:

I have been perusing the August 3 issue of AMERICAN AVIATION and methinks that your remarks about the hot water at Gander are very appropos. It reminds me of the guy who said that the most dangerous thing about flying the Atlantic was the hot water at Gander!

Living in Europe these last few years has, if anything, increased my Americanism—our philosophy that the working man should live, not just exist, as he does in Europe. But the one trademark we could well do without is the "snottish, bored, and indifferent expressions" that you speak about. 'Course it could be that I'm around New York too much and that the Newfies have just improved on the N. Y. attitude.

I think the "En Route" is a helluva good page.

BOB MOOREHEAD

Henry Hudson Hotel
New York, N. Y.

•

A TAIL TO TELL

To the Editor:

On page 75 of your July 6 issue, you picture the ease with which the MS 755 can be stripped and reassembled.

Your last picture is captioned "5:00-Trainer is now assembled again, ready for fueling and flight."

I am under the opinion that the pilot would be most embarrassed if he attempted to fly this aircraft as you have it pictured. I have always found the tail assembly is most helpful for reasonable flight characteristics.

JAMES M. DILL

Chief Engineer
UN & F Manufacturing Corporation
North Hollywood, California

(Very probably a pilot without his tail section would be as embarrassed as a caption writer without his bifocals.—Ed.)

•

EGG COSIES

To the Editor:

In your July 20 issue of AMERICAN AVIATION under heading "En Route" you describe as a new gadget "cosies for eggs." These have been used in this country for a long time, and I can remember them in my own home nearly forty years ago.

They were usually knitted or crocheted with colored wool to match the tea cosy and gave quite a gay and bright appearance to the breakfast table.

A more modern version can now be purchased, which I believe consists of a complete egg cup and muff on the vacuum principle.

H. A. FIRTH

British Overseas Airways Corp.
London Airport
England

DAL SERVICE

To the Editor:

I know that you do not think that AA has moved from Love Field to Amon Carter as the item about EAL's bid for a Dallas stop would imply (AMERICAN AVIATION, August 3). Sounds like an EAL press handout!

We still have pretty good service to DAL. In June there were 1108 departures. Only BUF, BOS, LGA, DCA, YIP and CHI had more and all these are in the traditionally high density area.

JACK O'DONNELL

American Airlines, Inc.
La Guardia Airport Station
Flushing, N. Y.

(For a clarification of the controversy that is currently raging at Dallas—mainly between American and Eastern—see News at Deadline.—Ed.)

Books

OUR NEIGHBOUR WORLDS, *by V. A. Firsoff. Philosophical Library, 15 East 40 Street, New York 16, N. Y. 336 pages. $6.00*

"A tiresome Roman character whose name I no longer recall—probably Cato the Elder—during one or another of the Punic wars coined the phrase *vivere non necesse, navigare necesse*, of which he made a good deal of use at the Senate. 'It is not necessary to live, it is necessary to navigate.'"

The author, who thus opens a chapter on space travel with a characteristic blend of humor and erudition, is convinced that Man stands very close to the threshold of an era of exploration that will make the voyages of the Elizabethans seem like so many trips down to the corner drugstore. Man is about to cut loose as he never has before, and this time the sea which he will cheerfully insist upon risking his life to navigate will be outer space.

Firsoff, as a qualified astronomer, surveys the solar system for the layman, and discusses space travel only as an adjunct to astronomy. Inevitably, however, the positions of cart and horse tend to reverse themselves, at least in the mind of the reader, since it is the present rapid development of rocketry and the practical imminence of space travel that will provoke in the thoughtful layman a desire to learn more about "our neighbour worlds."

In keeping with the popular style of the book, mathematical formulae are banished to the appendix. The tone, however, remains that of a scientist talking to an intelligent audience without abandoning either his professional standards or his sense of humor.

. . . WK

Meet Your Editors

Baer

AMERICAN AVIATION's new Military Editor, already somewhat leg-weary from pounding the corridors of the Pentagon, is Harry S. (Bud) Baer, Jr. Bud was in the unique position of beginning his job of aviation news gathering for AMERICAN AVIATION just two days after he left an Air Force position on which he had to have a "top secret" clearance.

Of course Bud Baer has been strictly non-committal on the details of this past position. We did learn that he had one of those long, long titles, so common in the military, that went something like this: Chief of the Research Information Branch, Office of Scientific Research, Air Research and Development Command, Baltimore, Maryland. During his two years at ARDC, he also spent some time tackling assignments in the Public Information Office and in Intelligence.

• •

The new Military Editor came east in June, 1951, from the famous aviation center in Dayton, Ohio. Near the home of the Air Materiel Command at Wright-Patterson AFB, Bud served as a newspaper reporter for three years, working on the morning *Dayton Journal* and later the afternoon *Dayton Daily News*. He was aviation editor, police reporter, court reporter, business reporter, wrote about education, tackled general assignments and did his share of writing "obits" (obituaries) as well.

At Dayton, Baer's enthusiasm in serving the aviation industry hit a new high. Covering Wright-Patterson AFB gave him a sound insight into the USAF and "how it's made." A flight in a Lockheed T-33 "Shooting Star" back in 1948 is still remembered. Besides, Bud earned his private pilot's license in a Cessna 140.

Bud was born in Chicago, Ill., in March, 1925. He attended prep school in Pittsburg, Kansas, and following high school spent two years in the Navy and a hitch in the Merchant Marine. He now holds a B.A. degree from the University of Oklahoma, and an M.S. from Columbia University's Graduate School of Journalism.

At this writing, Bud is still a disgruntled commuter between Washington and Baltimore and soon hopes to re-locate in nearby Virginia or Maryland. Appropriately enough, there are three Baers in his family: Bud, wife Emily Ann, and his 2½ year old Linda Suzanne. There is a fourth member, named Thornfield Lockehnstahl —but one cannot call a cocker spaniel a Baer.

• •

In addition to his duties as AMERICAN AVIATION's Military Editor, Bud also supplies the *Daily* with pertinent news about service activities in aviation. His column, "MILITARY COMMENTARY," appears regularly in the magazine.

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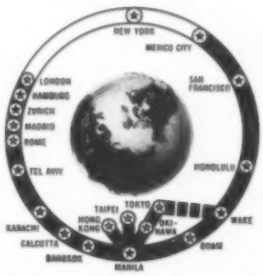

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EDITORIAL

The New Era

BY ACTION in the closing hours of the first session of the 83rd Congress, the United States on October 1 will enter a new stage in the method of payment to airlines for carrying of air mail and of the responsibility for further development of the nation's air transport system.

The Post Office Department will bow out for good as an agency playing any real part in the promotion and development of air transport. After October 1 it will be merely a purchaser of space or weight at the lowest prices it can obtain. It will pay only the minimum direct costs (or less!) of services rendered to it.

by W. W. P.

At the same time the Civil Aeronautics Board becomes responsible not only for establishing mail rates and "subsidy" rates but will actually be, for the first time, a disbursing agency making "subsidy" payments direct to the airlines falling in the "subsidy" class.

But there will also be a significant new factor which should not by any means be overlooked by industry. This factor is Congress, which will now be in a position of utmost importance relative to "subsidy" payments to all classes of carriers.

Ever since 1938 the CAB has set mail pay rates which became, for all practical purposes, obligations by the Government to pay. After October 1 the CAB will continue to set the rates *but must go to Congress each year and justify and obtain the funds for the succeeding year.* Every payment must be justified, item by item.

What, then, becomes of the security of an airline? What obligations can a "subsidy" class airline incur without knowing, from one year to the next, whether it will get mail pay sufficient for its needs? The truth is that it hasn't been sure all along. After October 1 it merely becomes a little less sure. The spotlight will be on "subsidy" payments. Justifications will be tightened up. The whole mail pay picture will become more difficult.

In the spotlight, particularly, will be local service and international carriers. Currently the "subsidy" is leveled at $79 million for this year, of which $22.5 million is for local carriers and $44.6 million for international. Trunks are set for only $3.7 million and territorial for $8.7 million. Whether the "subsidy" needs will increase is somewhat dependent upon the Post Office Department's expected drive to obtain even lower service rates for the mail. If these service rates should decrease, CAB will be asked almost surely to increase its "subsidy" figures.

Not only does this new scheme vastly increase CAB's responsibility, but it is destined to keep a large portion of the airline network in a constant state of uncertainty and fluidity. An economy-minded Congress, by shaving 10% to 20% off "subsidy" appropriations for a single year, can upset airline schedules and service to a substantial degree. Only the domestic trunks are, for the time being at least, stabilized.

The new era will bear close watching. It is clear that the promotional stage of air transport in the U.S. has reached an end.

Another Good Terminal

Add to the gradually growing list of good new airport terminals the newly opened facility at Newark. The New York Port Authority is to be congratulated for good planning, unusually good concessions, ample space for some years to come, good taste, and an excellent centrally located loudspeaker system which, incidentally, is operated by Allied Maintenance, which handles many other Newark services under contract.

Lieut. Gen. James H. Doolittle (ret.), who headed the President's airport commission created last year as a result of the series of accidents on Newark Airport approaches, has placed a strong stamp of approval on the airport with its fine new instrument runway. It is, he says, "one of the best and safest airports in the world." At the terminal dedication General Doolittle made it clear that existing close-in airports must continue to be used. An airport does not have to meet the absolute maximum criteria of an "ideal airport" to be both useful and safe, he said. Newark Airport is off to a fine start on its second quarter-century of service.

Orchids to Eastern

Eastern Air Lines is making a real contribution to the 50th anniversary of powered flight with its traveling air show of early airplanes. In fact it would seem that EAL is doing more than any other company or organization to bring the story of flight's rapid progress to a wide segment of the public. The Wright-era pusher, a 1910 Curtiss, the World War I "Spad", and the Pitcairn "Mailwing" of 1928 vintage, displayed on the ground and flown in the air alongside today's aircraft, demonstrate the advance of air power as dramatically as anything possibly could. At the same time the show points up EAL's own 25th anniversary.

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EXECUTIVE AIRCRAFT OVERHAUL

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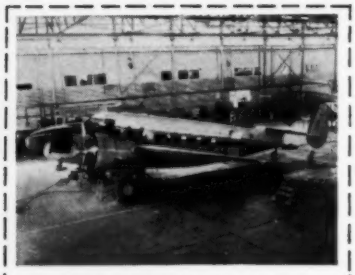
TEMCO



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Industry Spotlight

Although the U. S. Navy has issued second phase contracts to Bell and McDonnell for prototype work on their convertiplane designs, no such contract has been granted Sikorsky, according to industry reports. Sikorsky's initial contract was for the design of a folding-rotor type convertiplane. McDonnell is working on the unloaded rotor type and Bell on the tilting rotor design.

• •

Suggestions to use the Convair YB-60 airframes for accelerated testing of P&W J57's have been dropped and the U. S. Air Force has directed Convair to mothball the two prototype YB-60 jet bombers. Although the USAF could have had approximately three wings of the high speed B-60's on virtually an even exchange basis for the last few wings of production B-36's, the proposal was killed. One of the ships never did fly. The USAF did not supply engines for it. The other logged about 40 hours.

• •

A new primary trainer to replace its North American SNJ's will be procured by Navy's Bureau of Aeronautics, which has invited manufacturers to submit proposals. Beech, Douglas, Fairchild, Fletcher, and Temco are among firms that have entered. Trainer will be bought "off the shelf" after extensive tests on three of the entries. It is to be powered by a single piston engine, have a tricycle gear, speed of 155 mph, and service ceiling of 15,000 feet.

• •

Convair's Fort Worth division, which is slated to end production of B-36's late next year, is taking on more work from the main plant in San Diego. Surplus capacity at Fort Worth is being used for parts production on Convair's F-102, T-129, and C-131 for the Air Force and R3Y turboprop seaplane transport for the Navy. Another project is output of tooling for another classified military plane to be built at San Diego. Convair-Fort Worth, incidentally, remains the leading candidate for production of the Chase C-123B.

• •

Output of titanium will take a jump in 1955-56 as a result of a new Government contract ordering a Crane Co. subsidiary to build a $25 million plant with capacity of more than 6,000 tons of titanium sponge a year. Cramet, Inc., the Crane subsidiary, has not yet picked the site, but a new plant near Nashville, Tenn., is being considered. Facility will also have equipment to produce titanium ingot and alloys. U. S. will have first priority on Cramet's production.

• •

First of the two Convair 340's to be equipped with Allison T56 turboprop engines under a USAF contract is now at Fort Worth for preliminary tests. First flight, however, will not take place until next spring. AF, hoping to learn more about turboprops in a hurry, has also ordered two Boeing C-97's and two Lockheed Super Constellations fitted with Pratt & Whitney T34's.

• •

USAF will hold another day fighter design competition for a stripped-down "superiority" fighter this fall. The new craft will provide an alternate design to Lockheed's F-104.

• •

Defense Department has allotted enough steel, copper, and aluminum to CAA's Office of Aviation Defense Requirements for the fourth quarter of 1954 to take care of supplies needed for maintenance, repair, and operation (MRO) of both U. S. and foreign air carriers. Under the Defense Materials System, builders of commercial transports get equal priorities with the military, but producers of lightplanes have no materials priorities at all.

• •

Overhaul life of the deHavilland Ghost turbojet engines used in the Comet I has been officially extended to 600 hours by Britain's Air Registration Board and British Overseas Airways Corp. has begun a trial run of 750 hours between overhauls. Average Ghost used by BOAC has been attaining 85% of its approved life.

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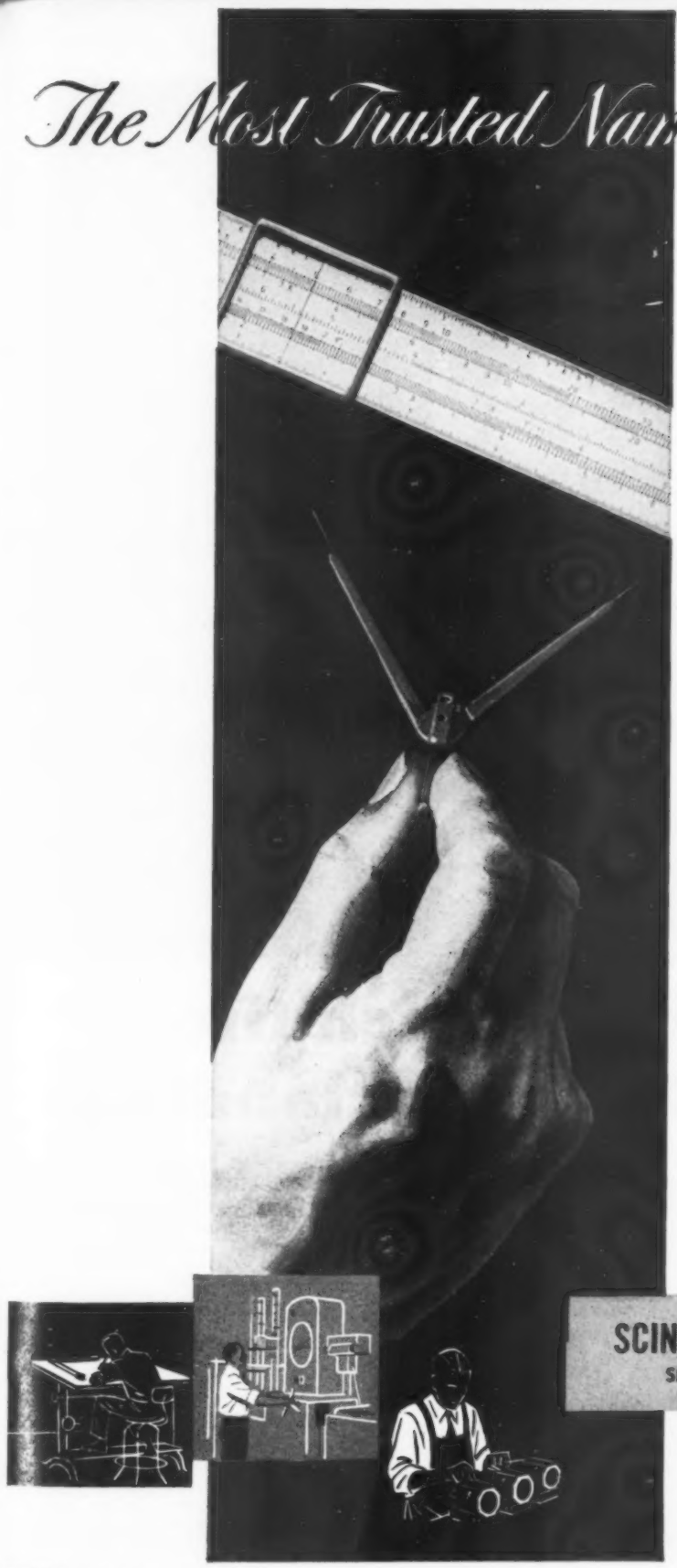

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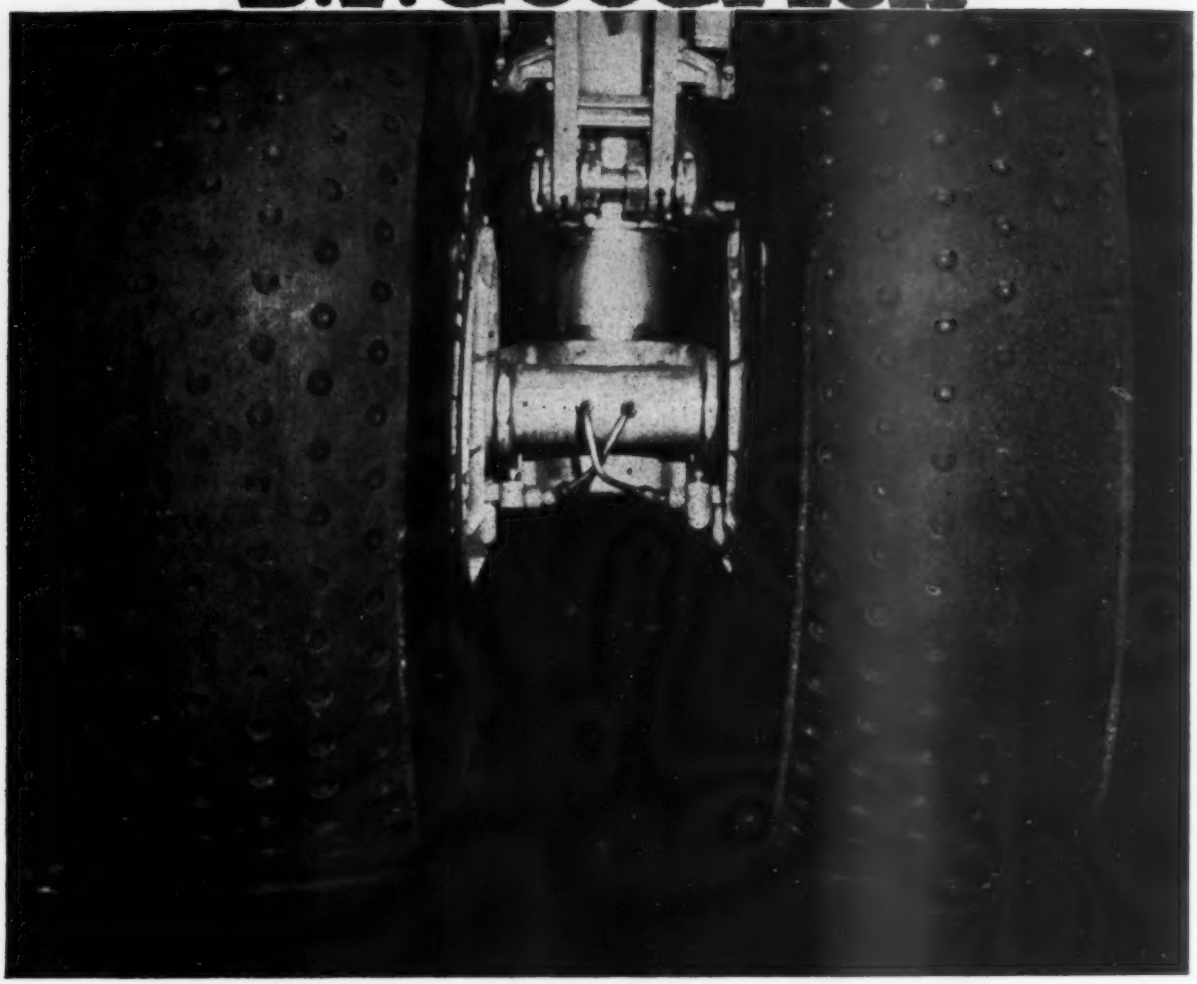

New B.F.Goodrich tire gives up to 27% more landings

RESULTS are now coming in from still another airline testing the B. F. Goodrich dimpled tire versus standard airplane tires of other makes. They indicate the new BFG tire gives up to 27% more landings per tire.

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On the basis of its test showing, Pan-American Airways is adopting the dimpled tire as standard equipment. Twenty-three other airlines have also standardized on the B. F. Goodrich dimpled tire—many, like Pan-American, as a result of their own test programs. They include: American, Braniff, Capital, Central, Continental, Empire, Frontier, Hawaiian, Lake Central, National, Northeast, Northwest, Philippine, Pioneer, Southern, Southwest, Trans-Texas, United and West Coast.

B. F. Goodrich is now producing the new dimpled tire in seven airline sizes. Like the recently announced Tubeless Tire for combat jets, it's another first in aviation tires from B. F. Goodrich, leader in rubber research and engineering.

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MARTIN'S B-61 Matador, first of the USAF's pilotless aircraft, is now undergoing tests at the Missile Test Center, Cocoa, Fla.

U. S. Renews Emphasis on Interim Missiles

Some 21 missiles in or near production may form the core of nation's defense; next year's budget: $1 billion.

By Robert M. Loebelson

THE END of the Korean war has once again focused U. S. attention on the nation's principal potential enemy, and military leaders in the Pentagon have intensified their thinking on what weapons they would use against Russia if war should break out in 1954 or shortly thereafter.

Despite the reduction in the Defense, and especially the Air Force, budget for the current fiscal year, the retiring Joint Chiefs of Staff were still maintaining that the year 1954 marked the time when the U. S. would face its greatest danger from the Soviets. Both the outgoing and incoming JCS were fully aware that Consolidated Vultee's intercontinental B-36 is now an obsolescent airplane and its replacement, Boeing's B-52, will not make its appearance as a production model until the summer of 1954 at the earliest. The B-52, moreover, would certainly not be available in the quantities needed to equip Strategic Air Command wings until at least a year after that.

The obvious substitute, of course, is an intercontinental guided missile capable of being accurately directed to the target. Unfortunately, however, such a missile, by the admission of Pentagon experts, is still "several" years away. These experts state the U. S. now has the know-how to build missiles capable of reaching Russia, but they add that the electronic devices and other gadgets which would make the missile hit the target are still not available. Thus, while U. S. missiles could cross the ocean, they might land several hundred miles away from their planned destinations.

In summary, here is how the various branches feel about guided missiles and why they ask to be permitted to monitor their development:

• **Army**—"A missile is really nothing more than another artillery shell, and Army Ordnance consequently should have jurisdiction."

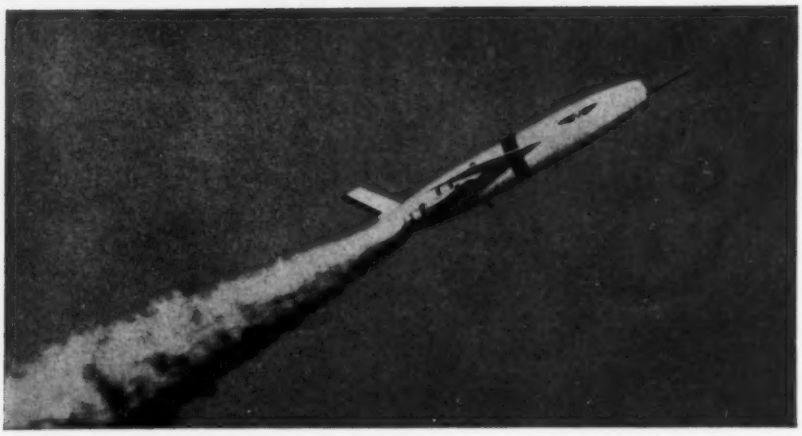
• **Air Force**—"Guided missiles are actually airplanes which have no pilots. Thus they are the responsibility of the Air Force."

• **Navy Ordnance**—"We agree with the Army Ordnance except that Naval ordance on missiles is a special problem which only we know how to handle."

• **Navy BuAer**—"As the Air Force says, missiles are just unpiloted planes. BuAer knows the needs for Naval Aviation's missiles."

Coordinating the various missile programs for the Defense Department is K. T. Keller, former Chrysler Corp. president. One of his principal jobs is to make certain that duplication is kept to a minimum. Military work in the guided missiles field is traditionally shrouded in secrecy, but the following known projects give a good indication of how much parallel effort there has been:

• **Army Ordnance:** *Surface to air*—Nike, developed by Douglas Aircraft and in production by Western Electric, and Loki, whose developer and producer are still unrevealed; *Surface to surface*—Corporal E, developed by Douglas and built by Firestone; Redstone, developed



NAVY MISSILE, the Chance Vought Regulus, will be launched from specially fitted ships for use against shore targets.

by Army technicians at Redstone Arsenal, Huntsville, Ala., and produced by Chrysler; Hermes, a series of missiles worked up by General Electric.

• **Air Force:** *Surface to air*—Boeing's F-99 Bomarc; *Surface to surface*—Martin B-61 Matador; Northrop B-62 Snark; Bell XB-63 Rascal, XB-64, and XB-65; North American Navaho (possibly either the XB-64 or XB-65); *Air to surface*—Hughes F-98 Falcon.

The U. S. therefore, while not abandoning the intercontinental missile, was developing interim missiles which would more or less do the same job when they were coupled with existing aircraft.

Offensively, the Nation could plan on three missile types, all of them designed to carry the war to the enemy's homeland. They include:

- **Surface-to-surface;**
- **Air-to-surface;**
- **Underwater-to-surface.**

To defend the continental U. S. or any of its advance bases from attack by enemy aircraft or missiles, there are three other missile types:

- **Air-to-air.**
- **Surface-to-air.**
- **Underwater-to-air.**

In the in-between category are the three types of missiles planned to combat enemy submarines (and it is on subs that Russia's navy is concentrating):

- **Surface-to-underwater.**
- **Air-to-underwater.**
- **Underwater-to-underwater.**

Obviously the various types of missiles under development have varying functions which frequently overlap. Each of the three services is intensely working to develop missiles designed for its own purposes in the hope of garnering control of missile output and production. The Navy, as a matter of fact, has two of its bureaus involved in missile work—the Bureau of Ordnance and the Bureau of Aeronautics.

Navy BuAer: *Surface to surface* (i.e., ship to surface)—Chance Vought Regulus; *Air to air*—Sperry Sparrow.

Navy Ordnance: *Surface to air*—Talos (builder unknown) and Convair Terrier; *Surface to surface*—Meteor (developer undisclosed); *Air to air*—Petrel and Dove (producers unrevealed); category unknown—Omar-Sidewinder.

ARMY officials refuse to identify this missile, which may well be the Douglas-Western Electric Nike. Nike anti-aircraft launching sites are being installed around major U. S. cities.

Thus, not counting such experimental and research missiles as the Army's WAC-Corporal and the Navy's Viking, and excluding target missiles and those still completely unknown to the public at large, it appears that there are at least 21 missiles either already being produced or scheduled to reach that stage in the relatively near future.

Although exact amounts are not available, there is little doubt that the three services this year will spend at least $1 billion on missiles. The Air Force asked for and got a total of $405 million for missile procurement, spares, pre-production planning and tooling.

For the same purpose Congress gave the Navy its requested $115 million. And while the Army's request for $2,440,739,348 for ordnance ammunition, which includes guided missiles, was reduced, it can safely be assumed that the cuts will involve purchase of ordinary ammunition like mortar shells rather than missiles, especially since the shooting has stopped in Korea.

In addition, the AF will spend $134,338,000, the Army $48 million, and the Navy Bureau of Aeronautics $25 million this year on research and development of guided missiles. Navy Bureau of Ordnance requested a total of $38,703,400 for R&D, but the breakdown of how much will be used for missile research is again not available.

The current fiscal year will mark the inception of relatively large-scale operations by all three services. Navy officials expect to begin using the Terrier and Sparrow in addition to the Regulus, the Army, the Nike and Corporal, and the Air Force is anticipating quantity delivery of Falcons, Matadors, and possibly Snarks and Bomarcs.

Principal test centers for missiles are Point Mugu, Calif., for the Navy, the White Sands, N. M., Proving Ground for the Army, and Holloman AFB at Alamogordo, N. M., and Patrick AFB, Cocoa, Fla, for the Air Force. At this latter facility, the AF soon expects to install an island chain of nine control points so that missiles can be directed over a 1000-mile course to Puerto Rico, and it is quite likely that Pan American World Airways will be designated contractor on the project with Radio Corp. of America as the subcontractor.

Whether all of this increased missile activity by the armed services will convince Russia that existing U. S. intercontinental bombers are not the only weapons capable of retaliation in case it decides to attack is open to question, especially since no accurate intercontinental missile exists as yet. But there is little doubt that U. S. missile developments will cause Premier Malenkov to think more than twice before starting World War III. • • •

Senate Non-Sked Report Attacked

A sharp attack on the Senate Small Business Committee's recommended five-point plan for liberalizing non-scheduled airline operations has been made by Sen. Edwin C. Johnson (D., Col.), who called the group's report "mere propaganda than a calm appraisal of actual conditions" and urged the Senate aviation subcommittee to define the non-scheduled carriers' role in the air transport system.

Johnson, a member of the subcommittee, hit the irregular lines' "relatively poor" safety record, CAA's failure to police them properly, and CAB's failure to settle the question of what to do with illegal operators.

The Air Transport Association branded the five-point plan an attempt to establish another airline network under different rules and called it a "mockery" of the Civil Aeronautics Act.

The committee's recommendations to CAB:

• **Issue a temporary regulation,** permitting non-scheduled carriers to fly 14 round-trips monthly between any two points, pending conclusion of CAB's Large Irregular Investigation.

• **Grant three-year exemptions** to four or five non-scheduled carriers or groups of non-scheduled carriers for rigidly restricted route-type service. Possible routes: Boston-New York-Washington and New York to Burbank and Oakland.

• **Authorize organizations** to serve as clearinghouses or exchanges in providing charters and common carriage, in order to pool irregular services for maximum public benefit.

• **Expedite the Large Irregular case,** to clarify these carriers' future.

• **Expedite the reopened** Trans-Atlantic Cargo Case.

The committee (1) called certificated lines the "backbone" of the air transport system and said their stability shouldn't be jeopardized; (2) said entry of new operators into the industry has been made excessively difficult; (3) criticized CAB for "bureaucratic indecision"; (4) warned that enforcement proceedings may put "economically significant elements" of the non-scheduled industry out of business; (5) favored Post Office contracts with irregulars for mail carriage.

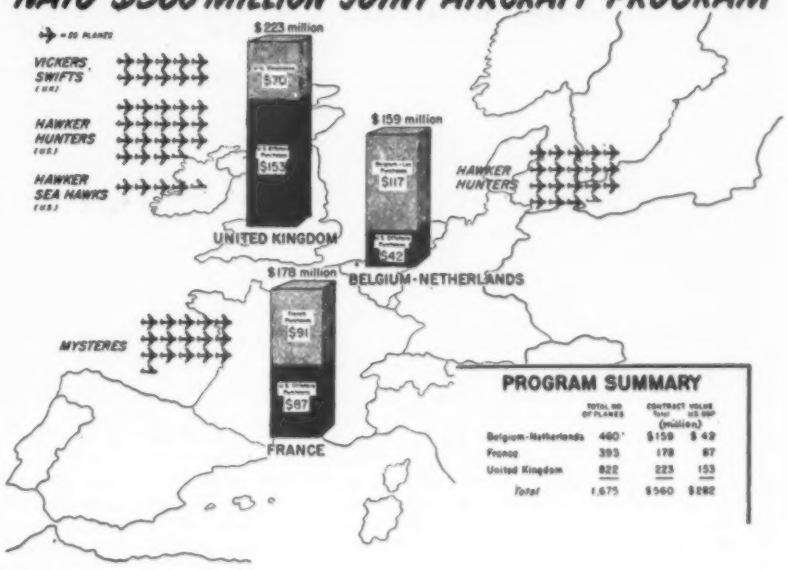
Sen. Johnson said CAB should either end all irregular route-type operations or define new legal limits for a type of operation that is "legally feasible." He called "unthinkable" the committee's proposal for three-year exemptions for non-scheduled carriers to engage in route operations when there is already "fierce competition" among airlines.

His attack on the irregulars' safety record was one of the sharpest yet made. Their 1948-52 fatility rate was 7.9 per 100 million passenger-miles, or over seven times that of scheduled lines, he said, adding that the "recent slaughter" of troops in non-scheduled carrier accidents has "shocked the nation. So far this year the non-skeds have had . . . four fatal accidents and killed 122 passengers."

Blasting CAA's "shameful" failure to enforce adequate safety standards, he said the non-skeds' record is one of "continuous overloading of planes, inadequate maintenance, untrained and overworked pilots, and disregard of prudent dispatching procedures . . ."

Adm. E. S. Land, ATA head, said a plan of 14 round-trips monthly, plus pooling, "conforms closely with operations of North American Airlines—a group utilizing four letters of registration under common management . . . and . . . done without the committee's recommendation that irregular operations be pooled." He added that it would be impossible to maintain "rigid" restrictions on route-type services.

NATO $560 MILLION JOINT AIRCRAFT PROGRAM



Over half of the $560 million for the NATO joint aircraft procurement program is coming from U. S. off-shore procurement funds, as shown in the above chart. For this reason all models contemplated for procurement under the program must be evaluated as "top flight" by the USAF before being purchased. Main production item in the program is the Hawker Hunter, which is to be built in the Netherlands (with engines from Belgium) as well as in the United Kingdom. Flyaway cost of the Hunter is $205,000.

Crop Duster Dies at 73

Henry Elliott, 73, said to have been the world's oldest crop-dusting pilot, was killed at Cleveland, Miss., August 4 when his light plane hit a telephone wire just after he had finished dusting a field. He had been dusting crops since 1924.

Kaiser to Buy Chase, Set Up New Company

Negotiations are nearing completion on a deal by which the Henry J. Kaiser Co. will buy Chase Aircraft Co. and will put a reported $1,750,000 into a separate company, which will be controlled by Michael Stroukoff, founder and president of Chase.

Under the agreement, which must be signed by September 1:

• **Henry J. Kaiser Co.,** which bought 49% of Chase for $2,450,000 more than two years ago, will acquire the remaining 51%, the Chase name, and rights to the Air Force C-123B (for which contracts were cancelled) and the commercial version of the plane.

• **Stroukoff will acquire** all stock in the new firm into which the Kaisers will put about $1,750,000. The company will have rights to acquire the plant, machinery and other assets of Chase's present facility at West Trenton, N. J., and will retain existing AF research and development contracts and rights to aircraft designs beyond the C-123B.

Agreement will end more than two years of wrangling between Edgar F. Kaiser, Chase board chairman, and Stroukoff, which was partly responsible for AF's decision to cancel C-123 production. Stroukoff insisted that Chase cargo planes be built at West Trenton, while Kaiser was adamant in his position that Willow Run be used.

Convair's XF2Y-1 Sea-Dart hydro-ski jet fighter, world's first delta-wing seaplane, was demonstrated publicly for the first time late last month. Company has a still-unannounced limited production order from the Navy, probably for not more than 15 planes. In preliminary tests, Sea-Dart has not gone over 500 mph or above 15,000 feet. However, it obviously has been designed to attain supersonic speeds in production models, which will be powered by Westinghouse J46's. Prototype has Westinghouse J34's.

No New CAA Airport Funds Voted for '54

After numerous House-Senate conferences, Congress voted no new money for CAA's federal aid airport program for fiscal 1954, ending next June 30.

The airport item delayed the entire Commerce appropriation several weeks, with the Senate insisting on providing $12.5 million in new money and the House unwilling to vote any funds. The Senate gave up on the last day of the session.

CAA's total fiscal 1954 appropriation is $138,785,000, while CAB receives $3,750,000. CAA gets $105 million for salaries and expenses, $7 million for establishment of air navigation facilities, $750,000 for technical development and evaluation, $1,085,000 for air navigation development, $22.7 million for Federal airport program liquidation, $500,000 for maintenance of Alaskan airports, $1,350,000 for maintenance and operation of Washington National Airport, and $400,000 more for construction there.

Pioneer Goes Back To Fleet of DC-3's

A fleet of nine DC-3's is expected to be placed in service by Pioneer Air Lines by early September. The planes, said to be former United Air Lines DC-3's, will be leased with an option to purchase and will completely replace Pioneer's nine Martin 2-0-2's. The latter have not yet been sold.

First of the DC-3's will be received soon and the equipment will be substituted for Martins on a plane-by-plane basis. Conversion will be complete next month. Pioneer has been flying 2-0-2's for 14 months, but its mail pay has been on the basis of a lower-cost DC-3 operation by virtue of a CAB decision last March. Because the line is on a final mail rate it had no recourse to Federal subsidy to cover losses incurred over that period.

Subsidy Proposed for Local Transport Design

A bill (H. R. 6482) to stimulate production and testing of transport aircraft suitable for local airline service was introduced in the House by Rep. Carl Hinshaw (R., Calif.), and early consideration has been promised at the next session of Congress.

The measure, patterned after a now-discarded jet prototype bill, provides that the government will lend up to 75% of development cost of a local service plane, with an $8 million maximum to any one qualified manufacturer. Loans would be repayable in 10 years at 1% interest. However, for every plane sold to an American airline the loan would be reduced by 1/15th, and if the builder sold 15 the debt to the Government would be written off.

A one-year test period of the prototype by an airline or group of airlines would be authorized, with CAB underwriting operation costs.

Navy Jet Base Plan Half Finished in '54

By mid-1954 the Navy's system of master jet stations throughout the United States should be half completed, Navy officials have indicated. Conceived in 1949, the plan calls for eight major complexes located near established industrial-seaport stations.

The master jet airfields and the industrial-seaport stations near which they are located include: Brunswick, Me., near Quonset Point, R. I.; Oceana, Va., near Norfolk; Cherry Point, N. C., near Norfolk, Va.; Cecil Field, Fla., near Jacksonville; Miramar, Calif., near San Diego; El Toro, Calif., near San Diego; Moffett Field, Calif., near Alameda; and Whidbey, Wash., near Seattle.

Each of these master fields is linked to two nearby major satellite fields and as many as six minor fields that can be used for training, testing, and for emergency operations, Bureau of Aeronautics authorities have said. They will have two runways, each 8000 feet long and 200 feet wide, capable of handling aircraft weighing more than 100,000 pounds.

Test flight of the Custer Channel Wing at Oxnard, Calif., found the CCW-5 airborne after a run of less than 100 feet and landing with power off at less than 40 miles per hour. Flight was designed to test control and stability, according to W. P. Custer, inventor of the novel airfoil; tests now in progress will check the hovering characteristics predicted for the aircraft.

Military Cuts Duplication of Plant Reps

Services split up responsibility for contract supervision; overlapping eliminated in 475 plants.

By Fred S. Hunter

TRADITIONAL military procedure, whereby each branch of the armed forces assigns its own men to handle the field administration of defense procurement contracts held by manufacturers and suppliers, is undergoing a startling and effective readjustment with tremendous progress making itself evident in the west.

Under the old formula, it was commonplace to walk into the plant of a manufacturer who held separate contracts for a widely divergent number of items with the Air Force, the Navy, Army Ordnance, Signal Corps, Corps of Engineers and other buying segments of the armed forces, and find that each individual service had its own representatives stationed in the plant to handle quality control, inspection and acceptance of items contracted for independently by these various branches of the Department of Defense.

Today, through exchange agreements consummated at the local operating levels of the various services, a significant transformation has taken place which has been crystallized only within the last 90 days. By means of it duplications are being eliminated and the services are cooperating fully with one another in saving money for the taxpayer in hundreds of manufacturing plants in the west.

Already substantial savings have been realized in the utilization of manpower; cost of transporting field procurement specialists has been almost halved and manufacturers and suppliers holding defense contracts with more than one of the services have their operations greatly simplified since they now need deal with only one designated agency of the Department of Defense.

The various services have agreed to represent one another, not only in the phases of quality control and acceptance, but in many cases in the complete field administration of contracts.

The arrangement is that the service having the largest volume of contract work, or the most dominant history of interest and/or continuity of contract in an individual plant becomes the administrative agency, not only for itself but also for at least one, and sometimes two, other units of the armed forces doing business with the firm holding contracts with more than one service.

The ball began rolling on this "hard sense" approach when Maj. Gen. William M. Morgan, commander of the Western Air Procurement District, met in Los Angeles with Capt. N. A. Draim, western district general representative of the Navy Bureau of Aeronautics, to discuss the duplicate inspection services being conducted in a number of manufacturing facilities in the Southern California area.

Since the aircraft industry in the west produces more than half of the nation's aircraft and supplies both the Air Force and the Navy, it wasn't difficult to pick out the manufacturing plants where representatives of several of the services were assigned to almost identical duties on procurement contract administration, though each was concerned with different items.

Gen. Morgan and Capt. Draim agreed to a coordinated plan of action. The spearhead for an overall corrective campaign was to start with the inspection phase on contracts. Air Force responsibility was assigned to Col. Edward A. Wine, chief of quality control for the Western Air Procurement District, and his staff of officers and civilian specialists.

Navy Representatives

Representing the Navy in continuing studies and negotiations were Capt. Draim, together with Capt. J. D. Arnold, Western District, Bureau of Aeronautics, Capt. J. S. Laidlaw, supervisor, inspection of Navy materiel, and civilian specialists.

The Navy representatives began working with Col. Wine's staff in exploring the possibilities of Navy inspectors taking over quality control and final acceptance for the Air Force in some plants, with the Air Force inspectors doing the same for the Navy in other plants.

Gradually, local exchange agreements were worked out whereby either Navy or Air Force assumed single cognizance or jurisdiction in certain small plants.

The first agreements were in the nature of experiments which would have to produce evidence of efficient workability and unassailable results. A worry confronting both Air Force and Navy was that the two services differed in their technological identifications as applied to quality control and also to acceptance procedures. These rough spots gradually were overcome.

Before a finalized method of overall procedure was worked out there were at least 50 meetings held between the Air Force and Navy officers and civilian specialists in Los Angeles.

There are now 475 industrial plants in the west wherein both the Air Force and Navy have local procurement contracts in progress and concerning which local exchange agreements have been concluded. A detailed, point-by-point agreement affecting each contract held by all these plants has been signed by both Navy and Air Force.

What started out in the west as agreements between Navy and Air Force covering small plants has now moved up into larger companies and both the Air Materiel Command and BuAer have given approval to broaden the base of these exchange agreements to the widest possible extent.

35 Major Plants

Expanded arrangements are now in effect in 35 major manufacturing facilities in the west where one service, instead of two, has taken over all phases of a contract, assuming full responsibility for quality control, contract administration, production expediting, property accountability, and also for all government furnished property, such as machine tools, etc.

The "across-the-board" agreements on these 35 contracts affect about 150 individual contracts, averaging four to five per plant, entered into originally by either the Navy or the Air Force. Where the Navy has cognizance, the Air Force keeps only one liaison representative on duty in that plant to answer technical questions and make progress reports to the Air Force. Similarly, where the Air Force has cognizance, the Navy maintains only one liaison representative for the same purpose.

"Under this exchange agreement, manufacturers and suppliers need deal with only one fountain head, which simplifies the contractor's work," said Col. Wine. "Each service accepts the end results of the other service. We are totally satisfied with the work the Navy is doing for us; and the Navy is satisfied with the work we do for them."

The spade work done by the West-

ern Air Procurement District of the Air Force and the Western District of the Navy Bureau of Aeronautics is pointed up by the following examples:

The Air Force turned over plant cognizance to the Navy at the Goodyear Tire & Rubber Co. plant at Litchfield, Ariz. In turn, the Navy turned over plant cognizance to the Air Force at Rohr Aircraft Corp. plants at Chula Vista and Riverside, Calif.

At the time the contracts at the Goodyear and Rohr plants were analyzed, the Air Force interest at Rohr was predominant and the Air Force also had more work under way at Litchfield. But the Navy program immediately ahead at Litchfield, and extending long into the future, held more weight. The Navy also has an airfield at Litchfield. There was no question the Navy would have the greatest need and the largest operation at Litchfield. Thus the Navy was given cognizance. To utilize its manpower to best advantage, the Navy then transferred its personnel from the Rohr plants to Litchfield, and the Air Force now has the responsibility for the power packages Rohr produces for Navy planes.

USAF at Marquardt

At Marquardt Aircraft Co. the Air Force took over single cognizance, since it had the larger activity, and the manufacturer had bought government equipment and was already in production. Navy work at Marquardt was in a research and development stage.

At San Francisco, plant cognizance at the Eitel-McCullough Co., electronics, has been given to the Signal Corps by the Air Force. At Seattle, the Air Force has turned over cognizance at the Kenworth Corp. to Army Ordnance. At Oakland, plant cognizance at Superior Sleeprite Co. has been transferred from the Air Force to the Army Quartermaster Corps. At Goodyear Tire & Rubber Co., Los Angeles, the Corps of Engineers has withdrawn its staff, with the Air Force handling the Engineers' contract on pontoons. At San Leandro, Calif., the inspector of Navy materiel staff has withdrawn from the Friden Calculating Machine Co. and the Air Force will handle contracts for both services.

An interesting development took place at Hall-Scott Motor Co., San Francisco. The Air Force, which had cognizance at this plant, turned it over to the Navy. After the Navy took over there was a re-evaluation of all contracts in the plant by the Navy and with the consent of the Air Force cognizance was then transferred to Army Ordnance, which had a preponderance of work in this plant in connection with their procurement of marine engines for amphibious equipment.

The Air Force handles cognizance of all California plants of North American Aviation. For its T-28B trainer contract, the Navy did not need to set up an organization to administer the contract at Downey, but turned the job over to the Air Force, which already had an experienced staff operating in this plant.

Conversely, at the North American plant in Columbus the Navy holds plant cognizance and is administering all field procurement activities on the F-86F's being built there for the Air Force.

Navy-Air Force exchange agreements are in effect at two plants of the Douglas Aircraft Co. in California. The Navy has cognizance at Santa Monica and administers work for the Air Force and Army Ordnance. The Air Force has cognizance at Long Beach and administers contracts for the Navy. At Northrop Aircraft, the Air Force now also administers contracts for the Navy.

In addition to saving dollars for the taxpayers, the services adopting the new plan are finding they are getting greater values in accelerated production. With a single executive authority representing the Department of Defense, the bottlenecks which existed when two services represented Uncle Sam in the same plant are eliminated. The services also were thin on qualified personnel and the exchange system doubles their effective manpower.

• • •

News Briefs

U. S. **aircraft exports** are expected to exceed $820 million this year, three times more than 1950, when Korean war began, and almost seven times more than 1939, at start of World War II, the Aircraft Industries Association has said. Most planes will be military types shipped under MSA program to U. S. allies. Civil plane and engine exports will total $50 million.

• •

The 100th Convair-Liner 340 has come off final assembly line at Convair's San Diego plant. Plane was Delta-C&S' 10th.

• •

Philippine Air Lines ordered a Hiller 12B for delivery August 19 in program to determine feasibility of incorporating helicopters in PAL's domestic operations. A. Soriano and Co., which manages PAL, has been granted sales rights for Hiller helicopters in the Philippines and Formosa.

• •

United Aircraft Corp. and de Havilland Propellers Ltd. signed a license agreement under which the **British firm will make Hamilton Standard-designed cold air turbine units.** Two basic types will be built, one for bombers and transports, another for fighters.

• •

Air Force B-47 set a **trans-Atlantic record,** flying from Limestone AFB, Me., to Fairford, England, in four hours 45 minutes. Previous record (B-47) was five hours 22 minutes.

• •

Slick Airways plans a 14% general **cargo rate increase,** effective September 7, and The Flying Tiger Line may file a similar boost. TWA plans to increase only directional commodity rates. Other lines, which have not supported previous attempts of all-cargo carriers to raise rates, haven't committed themselves.

• •

Scheduled Skyways has been formed by **four fixed-base operators** for scheduled air taxi service starting September 1 out of Tulsa, Okla., and Fayetteville, Ark. There will be twice-daily Cessna and Beech flights to 10 cities on seven routes. Participants are Combs Flying Service; Sky-Taxi at Tulsa Municipal Airport, which will be temporary headquarters; Highway Airport & Flying Service; and Ray Ellis, Fayetteville airport manager.

• •

The Senate confirmed the following **Assistant Secretaries of Defense:** Charles S. Thomas, supply and logistics; Donald A. Quarles, research and development; Franklin G. Floete, properties and installations; Dr. M. A. Casberg, health and medical activities.

• •

CAA has listed **qualifications of 77 individuals** separated from their positions in the recent reduction-in-force, in a move to help them find jobs. CAA's personnel officer will supply names and addresses to prospective employers. Included are 25 engineers, 18 mechanics and technicians, three ATR pilots.

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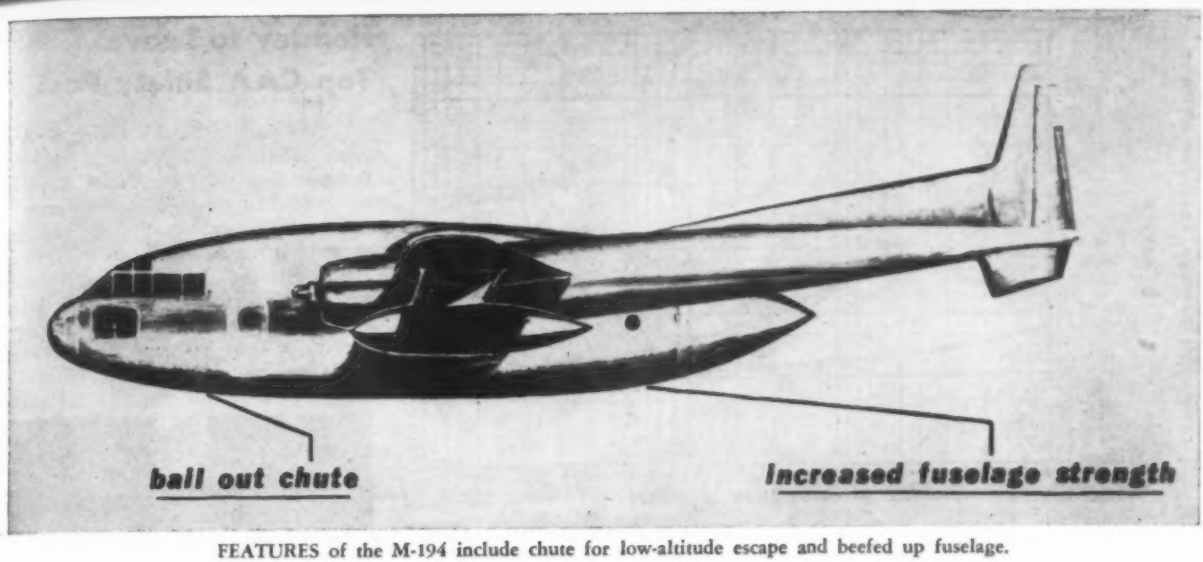
Westinghouse's **J46 turbojet engine,** to be produced in Kansas City and Philadelphia plants, **has completed its 150-hour run.** Engine is earmarked for twin-jet Navy fighters.



FEATURES of the M-194 include chute for low-altitude escape and beefed up fuselage.

New Assault Transport Design Revealed

Changes in control surfaces, landing gear, fuel tanks, set off Fairchild M-194 from present C-119G.

By HARRY S. BAER, JR.

A FLYING BOXCAR with major improvements over present models has been designed by Fairchild Engine and Airplane Corp. as a troop-cargo carrying aircraft which would work out of landing strips not far behind the front lines. Designated the M-194 by Fairchild engineers, the new model would be a rugged assault transport, one of the type which the military have indicated a need for of late.

This advance base transport that the Hagerstown, Md., aircraft company is proposing incorporates the following features which set it off from the current C-119G production model:

- **Improved control surfaces;**
- **External fuel tanks;**
- **Rough-field landing gear;**
- **Three-piece cowl;**
- **Flight-operable doors;**
- **Greater paratroop drop** and litter capacities;
- **Improved protection** for aircraft and occupants.

W. L. Landers, Fairchild vice president and general manager, said that his firm has put a great deal of effort into enhancing the performance of the C-119G and has come up with what he terms the "packaged improved performance units," listed above. The M-194 was designed by Walter Tydon, Fairchild chief design engineer.

"With comparatively little additional expense, we can manufacture an urgently needed transport with greatly improved performance characteristics," Landers says. "Although we do not yet have the prototype, we plan the embodiment of these new features in many of our production models during the next year and a half."

Mass production of the advance base transport would cost about $300,000 per plane on the basis of 300 aircraft. Present cost of the C-119G is approximately $265,000.

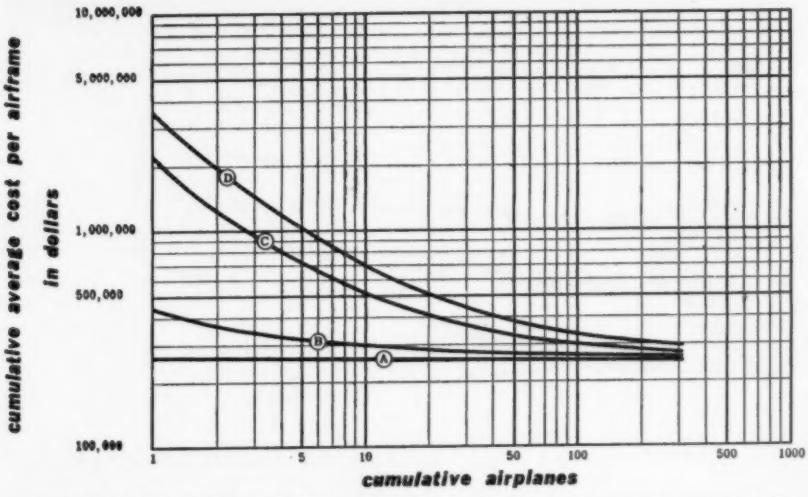
The improved performance of the M-194 will result particularly from general improvement of control surfaces in the form of high-lift flaps, spoiler ailerons, and high aspect ratio fins. Greatly reduced stall speeds are attainable with the new flap configuration. The high activity flaps with increased area will lower take-off distance, paratroop drop speed, and landing distance.

Incorporation of spoiler type inboard ailerons will reduce torsional wing loads, Fairchild officials say, and retention of standard outboard ailerons will eliminate

How Performance Would Be Boosted

Improved performance calculations of the M-194 as compared to the C-119G for a mission radius of 750 nautical miles (865 statute miles) would be:

	M-194	C-119G
Cargo	10,000 lbs.	9,450 lbs.
Take-off distance, ground run	1,630 ft.	1,925 ft.
Take-off distance over 50-foot obstacle	2,840 ft.	3,260 ft.
Rate of climb at sea level and normal rated power	1,110 ft.	1,095 ft.
Average cruising speed	170 kn. 196 mph	169 kn. 195 mph
Normal landing distance, ground roll at advanced base	660 ft.	1,370 ft.
Normal landing distance, ground roll at advanced base over 50-foot obstacle	1,435 ft.	2,315 ft.
Normal take-off distance, ground run from advanced base	820 ft.	988 ft.
Normal take-off distance ground run from advanced base over 50-foot obstacle	1,450 ft.	1,710 ft.



CUMULATIVE AVERAGE COST CURVES on advance base transport, compared to present Flying Boxcar, show the "A" line representing the present production C-119G; "B" the C-119G with new type wing; "C" the C-119G with new wing, rough field gear, and three-piece cowl; and "D" the addition of a beaver tail door to plane referred to on "C" curve. Curve "D" essentially represents the cost of the M-194.

need for emergency systems. High aspect ratio fins are expected to provide directional stability and control in excess of specifications.

One of the characteristic identifying features of the advanced base transport will be external fuel tanks hanging from the wing, according to Louis Fahnestock, director of engineering at Fairchild. In addition to speeding up refueling, Fahnestock says, the outside tanks reduce the weight of the Flying Boxcar fuel system by 900 pounds.

"Because of their location, they bring about minimum 'in flight' fire possibilities and also greatly cut down the possibility of crash fire hazard," he asserts. "Readily attached and detached for operational flexibility, the external tanks contain self-sealing blanket provisions which virtually eliminate fuel leak problems."

Fahnestock showed particular enthusiasm over the M-194's proposed rough field landing gear. Already successfully demonstrated on the C-119H, it affords stamina and versatility required for advanced base landings and take-offs, he notes. Weighing 350 pounds less than present C-119G gear, it reduces landing stresses on the aircraft structure and contains positive gravity lowering and fast retraction features.

No weighing or calculations would be required for loading the M-194, since pressure gages installed on the oleo struts show pounds applied to each gear. These readings,when plotted on a conveniently located loading chart, indicate take-off weight, center-of-gravity location, and approximate trim setting for take-off.

Rear doors designed in a "beaver tail" configuration not only give the M-194 a streamlined rearward appearance over the previous Boxcars and reduce aerodynamic drag, but are an important feature for the comfort of the crew. Some Packet drop missions have to be accomplished in adverse weather with the rear door removed, but the "beaver tail" doors can be opened and closed in flight.

Another advancement is the design of a three-piece cowl covering each engine. This provides easy access to the engines and accessories, speeding up and simplifying maintenance procedures.

Protection and safety features worked into the Fairchild design include bulletproof vest material shielding the pilot's and co-pilot's seats, aluminum alloy armor for engine accessories and oil cooler protection, bail-out chute from crew compartment, and dual main wheels and nose wheels.

The M-194's wingspan is 108 feet; length, 86 feet, six inches; and height to top of fins, 28 feet. It would be powered by two Wright R3350-85's turning 15-foot Aeroproducts F40F1-198-18M2 propellers. Paratroop capacity is 64 and litter capacity, 60. • • •

DC-7 Starts CAA Tests

The Douglas DC-7, powered with Wright Turbo-Compound engines, has started CAA certification flight tests at Santa Monica Airport and Los Angeles International Airport. The two planes being used now have total time of about 60 hours; the first plane has made over 20 flights and has been flown up to 25,000 feet. One plane is to be taken to Tulsa, which has a 10,000 foot runway, for brake tests.

Hensley to Leave Top CAA Safety Post

Top post in CAA's Office of Aviation Safety, which has been held for the past four years by Ernest S. Hensley, will change hands on September 1. CAA Administrator F. B. Lee has named Alfred S. Koch, now administrator of the agency's International Region, as director of aviation safety and has assigned Hensley to the long-vacant post of assistant administrator of Region Six in Honolulu.

Hensley

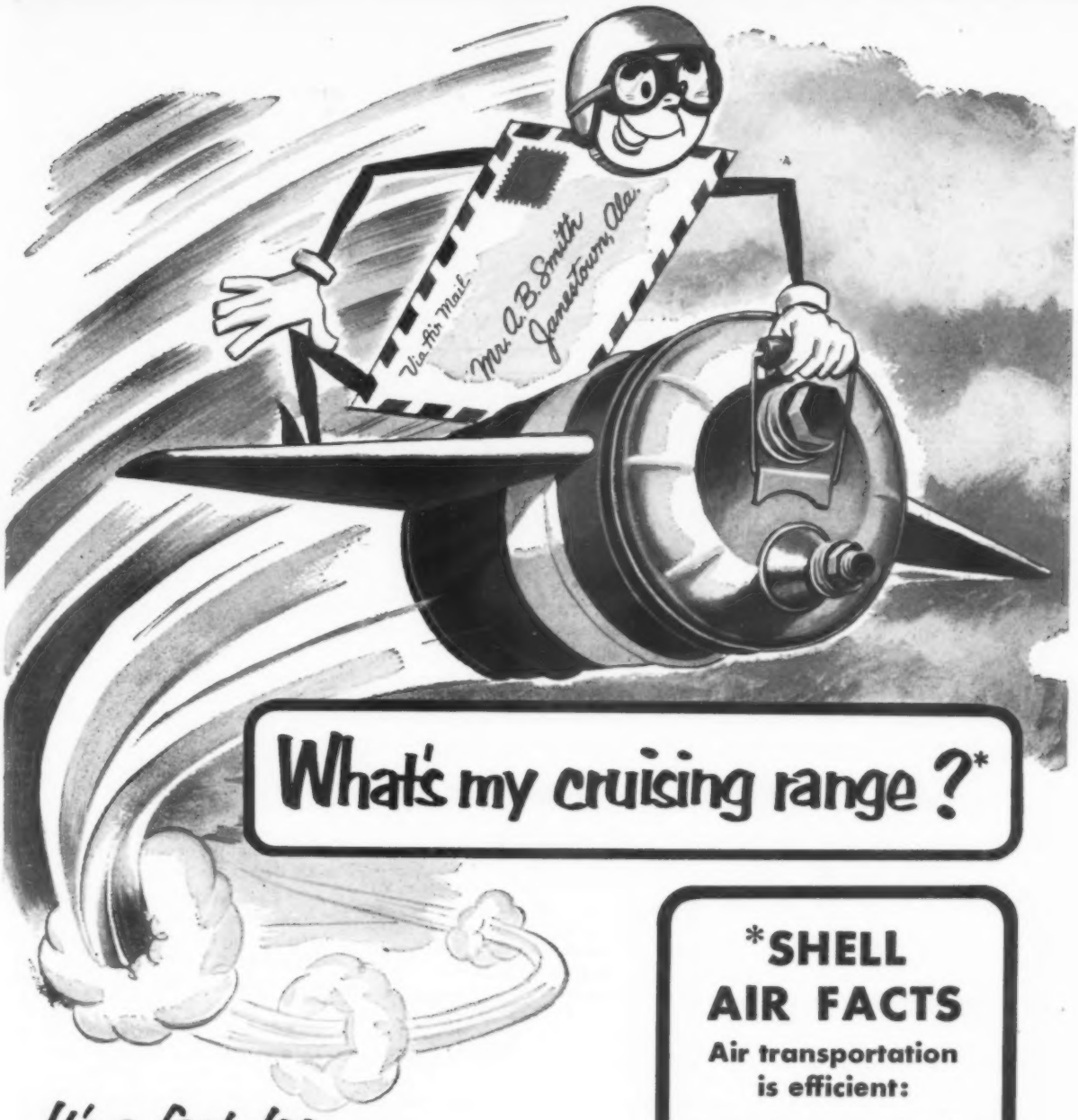
Koch

Frank C. Stone, now deputy administrator in the International Region, has been chosen to replace Koch.

The departure of Hensley from the key safety post came at his own request, Lee said, and Koch was selected for the position because of his wide experience in CAA safety activities and his past performance in the International Region in adopting advanced methods of operation. Lee also pointed out as a reason for his choice that Koch favors returning to industry those CAA functions which can best be performed there. Lee added that one of the first tasks facing the new safety director will be a study of present CAA activities with a view toward relinquishing such functions.

The move by Hensley to Region Six is the second major change in top safety posts in CAA this year. In January William B. Davis, then deputy director of aviation safety under Hensley, was transferred to a similar regional job in Kansas City, and his job has since remained unfilled.

While directing CAA's safety activities, both Hensley and Davis have repeatedly been the target of criticism by a weekly aviation trade magazine. On the announcement of his transfer, Hensley offered "no comment" in response to a query on these attacks. He observed, however, that on no occasion while head of CAA's safety office did he have the opportunity to talk with his critic, either in person or by phone, about the decisions for which he was censured. • • •



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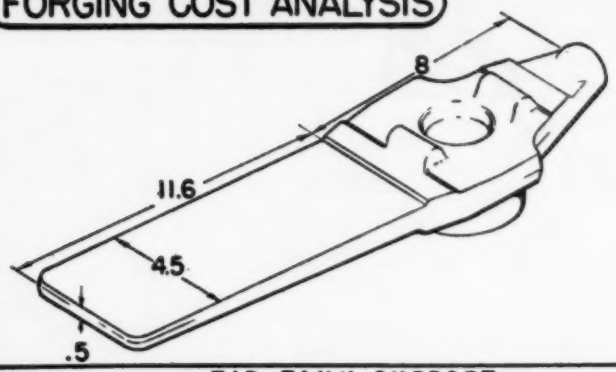
FORGING COST ANALYSIS



TIP TANK SUPPORT			
DESCRIPTION	8630 STEEL (ACTUAL)	NEW MATERIAL	
		PRODUCERS DATA	DATA FROM BASIC TESTS
COST OF FORGING STOCK	$ 0.10/LB.	$ 10.00/LB.	$ 13.00/LB.
MAT'L COST/ FORGING	$ 6.00	$ 195.00	$ 254.00
FORGING COST/ PART	$ 1.90	$ 5.70	$ 10.00
TOTAL COST OF FORGING	$ 7.90	$ 200.70	$ 264.00
MACHINING COST / PART	$ 130.00	$ 390.00	$ 500.00
TOTAL COST OF FINISHED PART	$ 137.90	$ 590.70	$ 764.00
WEIGHT SAVED PER PART		5.9 LBS.	5.9 LBS.
COST PER LB. OF WT. SAVED		$ 100.12	$ 129.50

WIDE VARIATION in machining costs shown here point to value of basic testing of new materials by aircraft manufacturers. Total cost of this finished part jumped 30%.

How New Materials Get into Production

Manufacturers look toward standard methods to cut time and expense between lab and shop use.

By Joseph S. Murphy

NO SINGLE INDUSTRY has been called upon to meet the challenge presented by the development of new materials to a greater degree than has aviation. Some materials, such as titanium, have been developed to suit a particular aviation need. Others, such as the plastics, had their origin outside of aviation, but immediately demonstrated a strong potential for use in aircraft manufacture.

But in either case the new materials—metals, plastics, ceramics, or adhesives—have brought to aviation a major problem and a new field of research: how best to get them into use both safely and economically.

Time was when aviation was a small business and the competitive advantage of buying and using a new wonder metal often resulted in its use in the manufacture of airplanes when little more than sketchy information on its mechanical properties was available from its producer. Just as often even less was known about its adaptability to manufacturing methods and processes.

As the aviation industry grew, and developed the specialized people who could intelligently analyze new materials and better foresee the manufacturing and service problems they might present when used in an airplane, new problems arose. The production demands of World War II overtaxed capabilities of manufacturers to the point where new materials were adopted on the face of their predicted greater strength or lighter weight, while possible manufacturing disadvantages or long-term service problems were overlooked.

But this situation was only a temporary setback in the advance of the industry, and with the postwar period new economic considerations entered the picture of new materials usage. The aircraft designer was now faced with civil and military customers who showed a more critical view in regard to the serviceability they expected of parts. The designer, in turn, demanded more authentic data of the new material producer, before even so much as an experimental purchase was made.

In effect this era has brought the producibility and serviceability of a new material to the same level of consideration given to the weight savings and structural advantages claimed for it.

This was the picture presented recently by Lockheed Aircraft Corporation's Howard W. Benjamin to aircraft engineers attending the semi-annual meeting of the American Society of Mechanical Engineers in Los Angeles. The Lockheed engineer told of today's handling of the new materials problem by aviation, and gave a comprehensive view of industry practice in getting basic fabrication data on a new material before it is released for design and production.

Now the span of time from the announcement of a new material to the point where it enters production use on aircraft may still be relatively short, but it is a period filled with activity, with the producer, the aircraft manufacturer, and the military services all playing a big role in speeding it into use on a safe and economic basis.

The new wonder metal coming on the market today is faced with many considerations, according to one procedure for its handling cited by Benjamin. It calls for:

- **Basic testing:** a spot check of its physical properties against data presented by the material producer to verify that its physical, chemical and temperature make-up will satisfy basic design needs. Fabrication testing calls for sample parts to be put through machining, forming, welding, forging, casting and processing operations, whereupon the results are compared with data on standard materials.
- **Cost consideration:** with the information from basic testing, both the material producer and the aircraft manufacturer are better able to project the potential savings the new material will bring.
- **Methods consideration:** the wonder metal is useless until ways and means of producing finished parts are developed, whether it involves adapting available equipment or designing new equipment to do the job.
- **Pilot line operation:** a production part of the new material is manufactured on a pilot line, and checked against production of the same part from a similar material on which labor and material costs have already been accumulated.
- **Transmittal of data:** throughout basic testing, information must flow smoothly and steadily to design and structural engineers. An eight-step method now in use is successful.

Major factor that spells success in analyzing the potential of the new material lies in the first step, that of basic testing. Second only to the testing itself is the importance of getting the infor-

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U. S. fighting aircraft, like this six-jet B-47, fly with Collins navigation or communications equipment. Airforce veterans remember Collins as the name on the first automatically tuned radio equipment used in World War II. Today, Collins plants in Cedar Rapids, Dallas and Burbank are hard at work filling orders that put Collins units on the latest military aircraft.

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mation to the people who need it as quickly as possible.

The approach being used, wherever it is possible, is to put the new metal through most of the conventional fabrication operations and then to compare the results with data already available on standard materials.

For machining operations samples are cut, such as in slab milling, straddle milling, end milling, slotting, turning, boring, and threading. Other samples are tested in reaming, tapping and grinding operations. Part costs for machining operations are analyzed on the basis of comparative floor-to-floor time, and among these costs are included any effects that the new metal may have on tool life. The need for completely new tooling is recognized, as are the possible effects that machining may have on the material that might cause high scrappage, or need for straightening or added surface treatment.

Most extensive are forming tests:

• **Bending** on standard brake tools with varying radii to arrive at data on minimum bend radii.

• **Joggling,** demonstrated using angle sections of varying depths and transition lengths, both hot and cold.

• **Drawing** characteristics, which are checked using a standard cupping die. Samples are gridded for measuring variations in elongation after drawing. Maximum draw depth is obtained for a depth-to-diameter ratio.

• **Stretching** properties are investigated using a standard die with varying radii inserts to obtain elongation data with grain and cross-grain. Samples here are also gridded for elongation analysis. Sheared and polished edge samples are used to bring out any tendency toward cracking.

• **Drop-hammer** parts are used to evaluate the more complex forming characteristics of the wonder metal. Operation is conducted at elevated temperatures, if necessary, to obtain best results, and grids are again used to measure shrink and stretch.

• **Rubber forming,** which is checked on a standard die with a one-inch flange, brings out the adaptability of the metal to withstand a 10% stretch and eight per cent shrink. By varying flange widths, stretch and shrink values from zero per cent to 20% are checked.

• **Dimpled shapes** and their quality are checked with conventional and coin dimpling, both hot and cold, and the pressure, dwell time, and temperature are recorded.

Basic testing of the material's welding characteristics is equally as thorough. Spotwelding integrity is checked by using single-spot shear and torsion tests. Maximum pile-up of the material and compatibility of similar alloys is established. Practice is to run consistency tests on 50 to 100 welds in panel form, and the material is then cross-sectioned at the center of the spotweld for metallurgical examination.

Flashwelding specimens are next prepared using tubing, bar, or plate stock and physical properties are evaluated in tension and bend tests. A variety of metal thicknesses and diameters is used to arrive at limitations in welding and design data. Metallurgical examination here brings data on grain structure flow and defects. Fusion welding is also checked by producing panel type specimens using a particular welding method.

Forging tests evaluate metal movement and show the need for varying standard techniques. The number of stages required to forge parts of the new metal is a strong economic consideration that is not overlooked. Metallurgical examination is conducted to show up such imperfections as cold shuts, tearing and laps.

For casting materials considerable coordination takes place between the user, the foundry, and the material producer to set up casting specifications as to material strength and its limitations for section thickness and flow of the material. Although the airplane producer is not interested in producing castings in his own shop, he does promote the use of favorable new materials by reputable foundries, to get the most use as quickly as possible.

Flow of Information

While basic testing continues, the processing characteristics of the new metal are checked in the laboratory to determine its adaptability to heat treatment, cleaning, surface finishing, and both metallic and non-metallic plating. Quality control techniques are checked and such inspection tools as X-rays, Magnaflux, Zyglo, and Dy-check are examined and inspection standards set.

However important the basic testing of new materials may be, it is limited in its value unless a steady flow of information can be handed down to design and structural engineers and manufacturing groups. This eight-step method has proved successful in bridging the gap from the first appearance of experimental data until production information is developed. It involves:

• **Production Design Bulletins:** to bring preliminary data to the designer for experimental design work and to acquaint him with the proposed use of the material and its design limitations. Bulletins are reissued as more information is obtained, and they are the forerunners of complete design limitations as published in the Design Handbook.

• **Design Handbook:** a compilation of design limitations of all manufacturing methods used in the organization. It becomes the designer's bible for quick reference in designing within the limitations of production equipment.

• **Structural Design Data:** before new material data have stabilized sufficiently for publication as ANC-5 "Strength of Aircraft Metal Elements" bulletins, certain required information must be obtained and published for design use. It includes tension and compression stress-strain curves, elongation in two inches, fatigue, bearing, shear and other design data.

• **Material Specifications:** in the absence of government specifications, a material specification for design, purchasing and inspection use is formulated. Based upon data obtained from producer and subsequent basic testing, the specification sets out allowable variations in the properties of the material due to mill practice, such as rolling reduction in sheet, plate or bar stock, tubing extrusions or other raw stock forms. Such general quality items as permissible surface defects and finishes are included.

• **Engineering Purchase Specifications:** a tabulation of all materials approved by Engineering for purchase, with reference to the particular specification from which the material is to be bought.

• **Process Bulletins:** a temporary document that spells out what must be done by manufacturing for fabrication, assembly, installation, processing and inspection of a new material. When the material becomes a production item, data from Process Bulletins are integrated into a Process Specification.

• **Process Specifications:** a manual to furnish engineering requirements for manufacture, processing, and inspection of airplanes and parts.

• **Manufacturing Process Standards:** compiled from data obtained in pilot line operation or other production tests, these standards cover manufacturing methods to be used, highlighting those that are new.

With this detail in the handling of new materials, it is apparent that the aircraft manufacturer has been saddled with no small nor inexpensive task in speeding their adoption in production. The job is one which must be shared by everyone involved.

It has surely grown to the point where standardization among manufacturers on fabrication testing of new materials is in order, and this standardization may very well come soon, as several manufacturers have already indicated interest in such a cooperative program.

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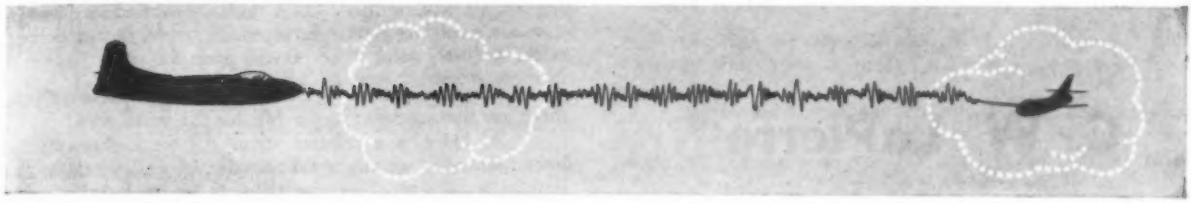
Radar eyes see in darkness, storm, or fog

to lock this twin-jet fighter on its prey . . .



—the Douglas F3D Skyknight

Out of Korea come new reports of the Douglas F3D Skyknight in action, downing Migs for the United States Marine Corps during advanced night and foul weather operations.

Designed for the U. S. Navy, the all-weather Skyknight flies at near-sonic speeds, operates from aircraft carriers as well as small advanced airfields. A side-by-side seating arrangement of pilot and radar operator results in closer combat teamwork—permits Skyknight's modern radar *search* and *fire control* equipment to be operated with maximum efficiency when against marauding enemy planes.

Performance of F3D Skyknight in action is another example of Douglas leadership in aviation. Planes that can be produced in quantity *to fly faster and farther with a bigger payload* are a basic rule of Douglas design.

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General Electric Co.

Design Trends in Jet Engines

C. W. LaPierre was appointed vice president and general manager of General Electric's Aircraft Gas Turbine Division last December 26. He had then been with G. E. since 1924, with the exception of a brief stay with the American Machine & Foundry Company (1947-1949).

A native of Jackson, Mo., LaPierre attended the University of Missouri's School of Engineering, then joined G. E. to work in its General Engineering and Consulting Laboratory. In 1936 he was placed in charge of the laboratory's electro-mechanical division. He received the company's highest form of recognition, the Charles A. Coffin Award, in 1937, for his development of the photo-electric recorder.

Upon his return from American Machine & Foundry he became assistant manager of the AGT division, and was named manager on November 15, 1949.

Q. Could you give us an idea regarding the logical size of engines we are apt to see in the next 10 years?

A. This is a matter under thorough discussion throughout the industry and the Department of Defense. Jet engines are so new that I don't think anyone knows whether they are going to get larger or smaller, and the participants in the industry seem to be playing both ways.

Q. Can you give me some indication of what signs there are that someone is playing for the small ones?

A. Size is a relative term. All jet engines to date have been what we might call "small engines." There isn't the limitation on size of turbines that there is on reciprocating engines. As has been demonstrated in steam power, 100,000- to 200,000-horsepower units are perfectly satisfactory. By comparison, our current 6000-pound-thrust engines look very small.

Q. There is not much indication you are putting the development work in engines of 5000-pound-thrust or less which will make them anywhere comparable in efficiency or reliability to the present 10,000- to 15,000-pound-bracket engines.

A. We have done a lot of work for many years in small turbines through our turbosuperchargers and accessory turbine devices. We believe we will have no difficulty in scaling our larger engines down to the smaller size as soon as the need for these sizes becomes evident.

Q. You feel there will be a trend back to design of new turbine engines in that small category?

A. I think the chances are very good that small turbines will be designed, but it is not yet evident that we won't need the large ones, also.

Q. From your present standpoint, where would you say the next break in engines is, in thrust output?

A. Nine to ten thousand pound thrust is the next break. I think it goes up approximately by the square root of two, so the next break after that will be fourteen or fifteen. And then there is another break beyond that—20,000 and so on.

Q. How long would you project for production engines in the 14,000- 15,000-pound category?

A. Three or four years, depending on the pressure.

Q. Are there any 20,000-pound British engines in test cells?

A. Not that I know of. For many years, we have been ahead of the British in regard to thrust.

Q. At one time engineers claimed that there would be a trend to combination axial and centrifugal flow compressors in future jet engines. Is that trend going to materialize?

A. I don't see it materializing. This whole art is so new I wouldn't bet much on anything not happening, but I don't see any trend at the moment. Everyone is trying to simplify engines rather than make them complicated. The complications are going to come later.

Q. What do you look on as some of the complications coming up?

A. I don't expect an increase in size to cause any complication, but improving efficiency may. The designers will be faced with adding weight and gadgets in certain cases to reduce fuel consumption.

4000 hp turboprop: "Ready within 10 years"

Q. How about a couple of examples of how that might be done?

A. Lots of thought is being given to variable jet nozzles for improved efficiency. These and other devices in turn tend to make the controls much more complex. Also, in the detail design of the engine, the engineers are continually faced with trading back and forth between the weight of the parts and the efficiency of their performance.

Q. Will it be necessary for you to resort to liquid cooling of the turbine in order to get higher efficiency?

A. I doubt it.

Q. Do you see new materials that are going to permit you to get this improved efficiency?

A. There will be a lot of talk about remarkable new materials, but the improvements will come gradually through step-by-step development of materials and better combustion and aerodynamic techniques.

Q. What materials loom on the horizon for high temperature turbine blades?

A. The new things that have been talked about are the carbides of various kinds. They are being investigated very thoroughly right now.

Q. Do you see the day approaching when engine manufacturers will have more powerful engines to offer than the airframe manufacturers require?

A. No. I don't think that will happen. I am not talking about certain classes of airplanes; I am talking about airplanes in general. I think they are going to get larger. The larger airplanes will require more power. But this can be obtained by more small engines or fewer large engines. That is the choice of the industry.

Q. As of this date, where would you be mentally drawing a line as to the foreseeable size of these engines? Do you feel the large turboprop, specifically, 4000 horsepower or more, will be ready for airline service within 10 years?

A. Well, if it is ever going to be used, it will be ready within 10 years.

Q. What is your best estimate of the total world flight experience on large (5000 horsepower or more) turboprop engines?

A. Such work has been very much under wraps, but I doubt if the total flight time is more than a few hundred hours.

Q. If you were to put that power break at 3500 horsepower, what would you say?

A. There is one British engine that might be included in this category. It would increase the number of flight hours substantially and I would hesitate to estimate how many hours that would be.

Q. How realistic is this talk regarding the likelihood of developing a large turboprop transport in the next five to six years, before a jet transport?

A. As far as this country is concerned, it does not appear to be realistic.

Q. Isn't it going to take eight or 10 years to get these large turboprop engines to a point where they will be accepted?

A. I think there are enough engines built and designed to give the experience in five or six years if it were vigorously pushed.

Q. Can we say that design of a turboprop engine obviously won't take as long as it took to get turbojet from scratch?

A. Probably, but not certainly, because the complications beyond the turbine shaft are very formidable. The additional gearing and propeller controls are complex problems requiring lots of experience for solution.

Q. Why should propeller control be so much more difficult?

A. Our experience is that propeller control for use with turbines must be several times as fast as for use with piston engines. I think also that turbine engines are going to be so much more reliable than reciprocating engines that attention will be focussed on the problems of the extra gearing and the propeller and its controls.

Q. How many flight hours would you estimate as necessary to establish reliability of such a turboprop engine to a civil use standard?

A. It is probably somewhat in excess of 10,000 hours.

Why Has G. E. Lagged?

Q. Why has G. E. apparently lagged behind in turboprop development work?

A. That's a very good question. G. E. designed and built the first U. S. turboprop engine, but the military demands for jet engines sidetracked this project. It concerned us greatly when we were forced into that position several years ago. However, in the meantime, so much progress has been made with jets and so many problems encountered with turboprops that we are not really so concerned now.

Q. How does G. E.'s production compare with other companies?

A. We believe our backlog and production to be the largest in the industry. We, of course, do not have direct access to all production figures, but we understand our current output to be very substantially in excess of any other jet engine builder. This tremendous production output is largely due to more than 4000 direct suppliers and subcontractors, and approximately 49,000 suppliers who back them up. And most of these 53,000 are small businesses.

Q. Do you agree with earlier industry opinion that an economical turboprop engine is not likely to grow from a turbojet?

A. I can't go along with that. Of course, the gear train and propeller control are all entirely different, but there is no reason why the insides of the engines could not be very similar and use many identical parts. Up to now, every time a new engine has been designed, it has been such an advance over previous engines that little or nothing could be used. This is because the art is advancing fast and not because there aren't similarities between turboprops and jets.

Q. Would you give us a capsule picture of the difference in turbojet and turboprop engines which exemplifies the problems of such a transition?

A. I think the major problem is in the parts not present in both engines; gear trains and propeller control.

Turboprops: "Propeller ... to determine the size"

Q. What experience in gearing problems does General Electric have which might give it a start toward turboprop work?

A. Gears are very important items in turbojet and turboprop engines, and this is an area where G. E. can really contribute to aviation progress. We have had a very long experience and outstanding success with turbine-driven gears. We have built propulsion gear units for aircraft carriers and battleships rated over 50,000 horsepower, with turbine speeds about 7000 rpm. On our 1200 kilowatt turbine-driven ships service generating sets our pinion speeds are about 12,000 rpm. Very few people have had comparable experience, and I think our designs show it. In expanding our jet engine output and getting people to make gears for us, I believe we have materially contributed to the know-how of the rest of the gear industry.

Q. Is there a program for applying that gear knowledge, which apparently is separated from aviation gas turbines as such, to the Aircraft Gas Turbine Division?

A. We buy all our gear designs from that same G. E. group; there is very close working relationship.

Q. Are you convinced there is a reason for going to turboprop engines?

A. If the turboprop were available right now, with the proper testing, there would be lots of reasons for going to it.

Q. You say, if they were available now. But they are not going to be available for six or seven years, conservatively?

A. That is the real question. They are not going to be available for several years and by that time the jet engine prospects will be so favorable that I think anyone who designs a new airplane will design it around a powerplant which looks more like the current jet engine than the current turboprop.

Q. Would you estimate what would be a logical size for a turboprop engine, what horsepower, to drive a big 125-150 passenger transport at 400-460 mph.

A. I think the size of the turboprop will depend entirely on the propeller availability.

Q. You don't feel there are propellers to absorb these powers at the speed required?

A. I don't see any problem with the engine and I don't see any major problem in gearing. So it is the propeller that is going to determine the size of those engines.

Q. Well, if you wanted to put four turboprop engines on a 200,000- to 225,000-pound transport for operation in the 450 mph category, what size engine would that require?

A. Well, that is a lot of horsepower; 200,000 pounds gets up around 10,000 horsepower per engine. We have had more operating experience on 10,000-horsepower turboprops than anybody else as far as I know. We ran the Turbodyne quite a while.

Q. What happened to the Turbodyne?

A. Frankly, we couldn't arouse any interest in it.

Q. Would you comment on the various manners in which reverse thrust might be achieved in jet engines and the related problems?

A. I think some effort is going into it, but I think the problems are pretty formidable. Reverse thrust can be obtained all right. It is being done.

Q. In this country?

A. No, not that I know of. But no one has done it yet without substantial loss of efficiency.

Q. On what order? Thirty per cent or 40%?

A. Well, no, I doubt if it is that much. The loss in efficiency for reverse thrust operation is that high, but I am talking about the loss that the equipment introduces into the normal operation of the engine.

Q. The French claim 10%, I believe, but I have heard it is more than that.

A. That is what they claim, and, even if it is as low as 10%, it would be economically impractical.

Q. What percentage do you think might be tolerable?

A. I think it should be down around one per cent or less.

Q. There seems to be a fair lack of interest on the part of the military in reverse thrust. Is that correct?

A. Yes.

Longer Runways, Higher Performance

Q. Is that a realistic approach from your standpoint?

A. I think it is. It is better to build longer runways and get higher performance for the military planes.

Q. Could you give me an idea of the three most promising approaches to reverse thrust and how that would be accomplished?

A. I think the French SNECMA design is the only one that has been really tried out and the rest are mostly design ideas. We are working on reverse thrust, but not to any great extent.

Q. In this country reverse thrust is pretty much of a dormant project at the moment?

A. Yes, it has been dormant, but I think interest is being aroused now. I look to see a lot more work in the near future.

Q. Do you feel reverse thrust provision should be engineered into the engine or can it be just as well accomplished with an accessory device?

A. I think it has to be a part of the engine.

Q. There is some feeling that this country has missed a bet by ignoring the by-pass engine. Would you comment on that?

A. Well, there has been lots of pressure on us at various times and some work has been done in this country. NACA made quite a few studies; I believe there was a development of a by-pass engine under way after World War II. Up until recently, as far as I know, there has been no interest on the part of our military for the by-pass engine.

There is some interest now, but as far as I know it hasn't been translated into any development contracts.

Q. Do you feel that there is a unique job which the by-pass engine can do that the conventional jet cannot?

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Production: "Costs have come down over 60%"

A. I don't think it is clear cut. I think the by-pass engine is one method to be considered to gain a last bit of performance after other possibilities have been exploited.

Q. What about the ducted fan?

A. I think the ducted fan is in the same category. The trend toward turboprops could change into a trend toward ducted fans or by-pass engines.

Q. The British appear to be developing a series of unusually lightweight jet engines. Are we matching these efforts?

A. They have a different problem entirely from ours. There is no place in the British Isles that is more than 80 miles from the sea. For this reason they want a very fast interceptor that gets upstairs in a hurry, and they don't worry about range.

If we started to guard the perimeters of this country with similar aircraft, we'd need huge numbers of them and bases all over the landscape. We have to start by flying hundreds of miles to get to our target. So a lot of their effort is devoted toward getting very lightweight high performance engines with very short range.

Our Air Force, so far, just hasn't been interested, and I can see why. I think it is not necessary that the two countries point in the same direction.

Q. How do they achieve these lightweight engines?

A. They sacrifice specific fuel consumption to do it and to some extent manufacturing man-hours. It should be pointed out, however, that British engine weights do not include as many accessories as do our weights in this country, and consequently the difference in weight is not as large as is commonly supposed.

Q. Generally speaking, which is the more efficient engine—a large or small one?

A. There is very little difference in efficiency, but there is a weight penalty to the larger engines.

Q. Doesn't the weight per pound of thrust go down with large engines?

A. No. There is an optimum size for low weight. A few years ago one of the industry experts felt that the optimum size was 5000 pounds thrust. Now you can find experts who feel that the optimum size is around 10,000 to 15,000 pounds. There may be others who feel that it is still higher.

The rule is that rotating parts of the engine will have a higher specific weight for larger size. However, the fixed part of the engines and the accessories do not increase necessarily with size. Consequently, it is a matter of balancing the increasing weight of the rotating parts with the decreasing specific weight of the fixed parts and accessories.

Q. Is there any hope of getting specific fuel consumption of jets comparable to that of piston engines?

A. Yes. The thermal efficiency of jet engines is already very good at high speed. Even if the piston engines could operate at such speeds, their thermal efficiencies would not be as good.

Other factors, however, must be considered in comparing jets with piston engines. Speed decreases the amount of equipment necessary to transport passengers. For instance, the trip from London to Rome is now being done in a little over two hours by the Comet. A conventional piston engine would take twice as long. So the one jet airplane would make twice as many trips per day as the piston airplane.

Q. What will a commercial jet engine of 10,000 pounds thrust cost for civil use on the basis of today's experience?

A. Some production J47 engines rated at more than 5800 pounds thrust are being delivered for less than $40,000, which is already very low in dollars per horsepower compared to available piston engines. The jet engines will also be much lower in cost than turboprop engines.

It is too early to say what jet engines are going to cost in quantity. We do know, however, that the jet engines will be very much cheaper per horsepower than piston engines.

Q. Are the reported civil costs of $125,000 per jet engines of 10,000 pounds thrust reasonable?

A. I think it is too early to say, as the art is changing so rapidly.

Q. Do you see any downward trend, any production know-how or anything else which is bringing cost down?

A. Oh, yes. Our costs have come down over 60% in four years.

Q. Throughout your operation?

A. Yes. Because of the quantity, improvement in technique, better know-how, and so on, the total cost improvement to the customer is actually a lot better than 60%. The engines last a lot longer and the overhaul cost is lower.

Over One Million Flight Hours

Q. Would you estimate the total flight time of G. E. engines?

A. It is well over one million hours.

Q. General Electric built the first U.S. turboprop engine?

A. Yes, it was an engine rated at about 1700 horsepower.

Q. And you have the biggest turboprop?

A. Yes, the Turbodyne, a 10,000-horsepower engine.

Q. Is it safe to say that the big one, the Turbodyne, is a dead project now?

A. Well, at the moment, yes. These dead projects sometimes come to life suddenly and that could happen here.

Q. You feel it had an interesting design?

A. Yes, I think the design was promising. Much of Northrop's work, before we acquired it, was done by former G. E. engineers, so that we felt quite familiar with the principles involved.

Q. When the afterburner was originally introduced it was called a turbo ram jet. Do you feel development of the combination turbojet/ramjet engine is going to materialize?

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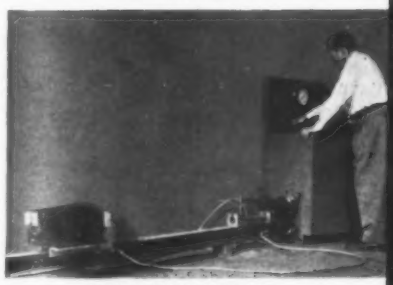

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Some G-E jets: 1200 hours between overhauls

A. I am not sure. They are, of course, useful for very high speeds and I think we are in a state of flux on the whole subject of high-speed propulsion.

Q. What are some alternative powerplants for speeds above Mach 1.2? If you are going to get that speed you can't use the present arrangement, can you?

A. I don't believe that 1.5 is the limit for turbojets.

Q. Would you comment on the strange history of the ramjet?

A. Yes. The idea seems so simple that everyone looks upon it as a pipe with fuel nozzles and that is about all. The trouble, of course, occurs in getting high enough initial speed to start the jet. If you have to provide the speed to start it the same propulsion system could be used to propel it. For this reason, the level of speed at which the ramjet comes into its own has steadily risen. Initially it was a little over Mach 1 and now it is well over Mach 2.

Atomic Work Continues

Q. How about this business of the atomic powered engine? They seem to have cut off the funds on that project.

A. No, that is not the case at all. We are continuing our efforts towards solving the power plant problems, but effort is being reduced on installation and flight testing problems. We believe that the main project of developing a nuclear power plant will continue to be supported.

Q. How much growth do you feel there is in a given design of jet engine as compared with a given design of piston engine?

A. Up to now most jet engines have had about a 50% increase in thrust during their life. In the future, it is expected that the designers will more nearly approach the ultimate in their initial design.

Q. Are we approaching a leveling off point at which thrust per square foot of frontal area reaches its peak?

A. There will be a leveling off point, but right now thrust per square foot is going up faster than at any time in the history of jet engines. We are beginning to find out how to do it. We are learning to handle air in the smaller passages at higher velocities.

Q. How about Russian engine development?

A. The Russians have very capable scientists and engineers and there is no reason to believe that they aren't carrying on advanced work in engines.

Q. What is the highest power that we know they have?

A. Of course, we know of 6000 pounds, but I think they are rumored to have 10,000.

Q. How about this engine that they picked up in Korea and brought back here, disassembled from a MiG? Did you get a look at that?

A. Yes, our people have seen it. It is a centrifugal type engine which we consider obsolete. Incidentally, we think our J47 engine deserves some credit for the 12-or-more-to-one kill ratio established by the North American Sabrejet over the MiG 15.

Q. As a practical matter, what approved overhaul times are they getting with General Electric engines?

A. Some G-E jet engine models, with more service experience, have 1200 hours allowable operating time between overhauls.

Q. Do you have any idea of what percentage of that they are realizing?

A. This 1200-hour figure is brand new, only recently raised from 600. While the 600-hour limit was in effect, we had some J47's which were allowed to accumulate around 700 hours. However, under combat conditions, the average operating time is only a fraction of that. This is due to planes operating off rugged landing strips where they can pick up dirt, debris, etc., and of course including enemy damage to the aircraft. However, I believe it is well established in press interviews with combat pilots that the turbine engine is the most reliable powerplant.

Q. Do you have any idea what percentage of parts is being replaced on jet engine overhauls?

A. No, we don't have too accurate an estimate on that. I will say this, though, that our spare parts requirements have diminished pretty markedly.

Q. What percentage of research and development work that you do for the military comes from research and development funds, as contrasted to what comes to you through procurement funds?

A. The answer to such a question is difficult, as it is hard to identify and separate production engineering from research and development engineering. Probably less than one quarter of our development activity is carried by research and development funds.

In commercial work, of course, we are accustomed to charging all of our research and development to current production and we think the aircraft industry should be allowed to operate as nearly as possible the same as any other business venture.

Q. Are you having any problem with the relationship between the Research and Development Command and the A. M. C.?

A. The industry has been following a policy of decentralization as it has grown, so that all of the elements for a decision are at a spot where the decision needs to be made. That is the general thesis.

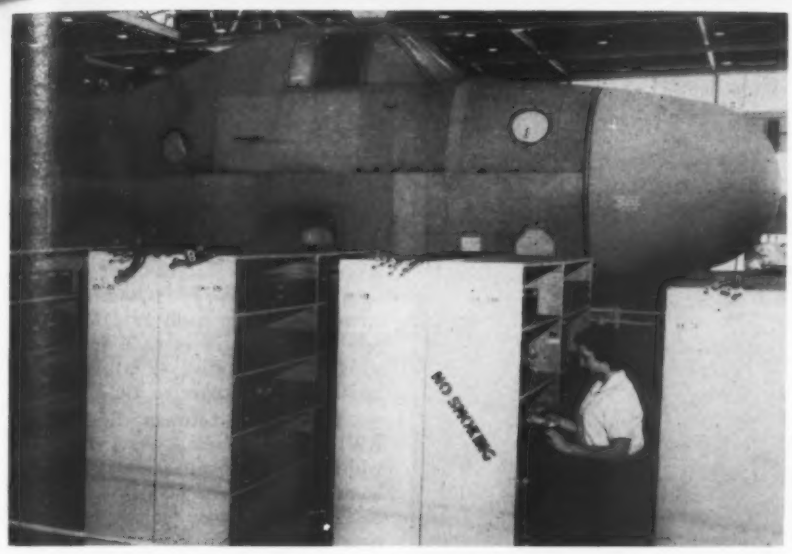
The Air Force has adopted a different policy and there is some difficulty in adjusting our normal operating procedures to fit their operating procedures.

Q. Can we expect much in the way of lower specific fuel consumption for jets?

A. Yes, recent experience shows specific fuel consumption can be improved approximately 10% with each successive engine design. With such gains in successive designs, we are not yet near the leveling off point.

Q. Do you think you can get competitive with the piston engines?

A. Yes. As pointed out above, speed is economically important, and passengers will be transported by jet engines cheaper than by piston engines. • • •



FINAL ASSEMBLY LINE for Martin P5M Marlin flying boat is decked with open stock bins, reported to have brought savings of $250,000 over central stockroom method.

Open Bin Stock Cuts Production Costs

Storing parts on assembly line reduces paper work, lost motion, and number of stock clerks needed.

A SYSTEM of open bin stocking of parts and materials, which takes all inventory from behind the steel fences and ceiling-high cabinets of a central stock room and places it within easy reach of the worker, is gaining an ever stronger hold among U. S. aircraft manufacturers. One by one the manufacturers, searching for ways to cut materials handling costs, are swinging toward this newer concept of stocking.

The reasons for the trend become quite obvious when one looks at the results being realized.

Good example is the experience of the Glenn L. Martin Co. of Baltimore, Md., the most recent firm to go to open bin stocking with the adoption of the system on its P5M twin-engine flying boat project for the U. S. Navy. In an exclusive report to AMERICAN AVIATION, Martin production experts tell of the early results:

• **Immediate reduction** in personnel requirements in the order of 50%. On the P5M project, where 100 stock clerks, expediters, or stock chasers were needed to support the centralized stocking system, the same job is now done with about 50 people.

• **Efficiency is up immeasurably.** Cumbersome paperwork and approvals of supervisors or requisitions under the old system are gone. And the lost time spent in frequent trips and long waiting at stockroom counters is eliminated.

In dollars and cents, the savings on the P5M project stand to reach $250,000 annually, according to George Huggins, Martin production manager. The switch to open bin stocking was one of the first steps taken by Huggins after joining the company last fall, and its overwhelming success points toward its adoption on all Martin projects. If the company were to make the change on all projects now under way or on the horizon, savings could reach one million dollars a year.

But the successes of open binning of stock go beyond tangible dollar savings. Martin has found that the workers' reaction to the new system has brought losses due to pilferage and work spoilage to a new low. Apparent reasons here are that workers and supervisors are given the joint responsibility for maintaining an adequate supply of stock for their job, and they are taking this responsibility seriously by making a personal effort to control any theft and spoilage that would reflect on their own performance.

Simplicity of system worked out by Martin is impressive. Parts coming from fabrication or outside purchase are all funneled to a central distribution area operated by three stock clerks. Here bin locator cards for the entire project show the station location to which the parts are to be routed and the quantity, in the event that a part is used at more than one work location.

After only a brief stop at the central distribution area, parts are moved by cart to the required work station, where a crew of floating stock clerks sees that they are placed in the proper place. Instead of having small-lot quantities of parts, the worker now has all parts for the complete project sometimes only an arm's length away, and if one becomes lost or spoiled, he has merely to reach for another.

At Martin open stocking accounts for more than 98% of the 30-35,000 different parts in the P5M project, with only one to two per cent kept under lock and key. A large number of these parts are government furnished equipment (GFE), which must be stored in closed areas by contract requirement, although in many instances the same components are stocked in open bins as Glenn L. Martin equipment.

The idea of open bin stocking in the aircraft industry is believed to have started with North American Aviation in the early days of World War II. NAA uses a "planned release" system where the required number of parts for a given project is allocated by a planning group. Parts are stocked in open bins with the supervisor held responsible for them. A lost parts account is kept, and supervisors make every effort to keep from getting on this account.

As at Martin, workers draw parts from open bins as needed without a requisition or any other type of paperwork. Only exception is what NAA terms a "sensitive" item, a part which is both valuable and portable, such as the ever-disappearing aircraft clock. These parts, which are few in number, are kept in stockrooms.

Among other manufacturers:

• **Douglas Aircraft Co.**—maintains close stock control. Parts are dispatched from central stockrooms to line stations. Each part is tagged for identification, and though a worker may not have to travel far for a part, it must be the right part, and is so tagged that there will be no mistake.

• **Northrop**—has used open bin stocking for the past two years. Change came at Northrop shortly after Kenneth P. Bowen, vice president of manufacturing, joined the company from North American.

• **Fairchild Aircraft Division**—uses the open bin system 100%, except for GFE.

• **Consolidated Vultee**—is now changing over to a modified open-bin system. On-the-shelf items and low-cost parts are stocked in open areas, with all other parts handled from a central stockroom.

• **Lockheed Aircraft Corp.**—uses open bins for miscellaneous small parts only, and refers to it as "free stocking." A similar set-up is in use at Republic Aviation. • • •

BWIA: Caribbean Carrier Grows Up

British West Indian Airways looks forward to delivery of Vickers Viscounts next year.

By ANTHONY VANDYK

PORT OF SPAIN, TRINIDAD—Fast developing into an integral part of the Caribbean scene is British West Indian Airways, a wartime "orphan" carrier adopted by BOAC.

"BWIA Connects the Caribbean" is the company's slogan and the clue to its existence: in 1940 KLM's service between Trinidad and Barbados was suspended and the main islands of the Eastern Caribbean found themselves, with normal shipping communications disrupted, virtually cut off from each other and from the outside world. The British authorities, therefore, called in Lowell Yerex, founder and owner of the TACA airline system of Latin America, to establish a British carrier for the Caribbean area.

BWIA has come a long way since Yerex started its operation in November, 1940, with one Lockheed Lodestar. Not only the British West Indies, but much of the rest of the Caribbean area has come to rely on BWIA for inter-island communication. Today the airline links 20 different points in 18 different Caribbean islands and countries on a route network of 7205 miles.

In order to fulfill its primary role of providing communications between the beautiful but poverty-stricken British West Indies, BWIA has to fly many money-losing routes which force the company to operate in the red unless the communities served treat it as their flag airline. At this writing discussions are in progress whereby all the British colonial governments in the Caribbean will give BWIA certain rights and facilities in the operation of its services throughout the area under a 10-year agreement. (Hitherto the company has concluded agreements covering its operations to the Leeward and Windward Islands and between Trinidad and Tobago.)

In the past the West Indian government paid subsidies to a Canadian steamship company to provide communications to and within the British West Indies, but this service has now been withdrawn and, apart from irregular sailings by schooners, the islanders have to rely on air transport for their communications.

Despite lack of backing from certain of the governments of the 18 West Indian communities which it serves, BWIA is making good progress toward reaching the break-even point. Deficits have been steadily reduced and the company would probably have ended its present fiscal year in the black had its fleet of Vickers Vikings not been grounded for several weeks this spring (due to no fault of the carrier).

In examining BWIA's financial status, however, it must be noted that since the company became a subsidiary of BOAC, grants totalling $1,580,000 have been made to help offset operational deficits. Moreover, BOAC has accepted temporary responsibility for certain routes (in fiscal 1951/52 BWIA gained $420,000 in revenue from operating routes north of Kingston, Jamaica, under charter to BOAC).

Teamwork between BOAC and BWIA in providing service to and within the Caribbean area is about to be extended. BOAC plans to inaugurate direct Constellation tourist service between the United Kingdom and the Eastern Caribbean (Barbados and Trinidad) in October, complementing the first-class Stratocruiser service to Jamaica. BWIA, in its turn, will improve its service in the Caribbean area and beyond, effective early in 1955, with the introduction of its three Vickers Viscounts.

Traffic Boost Expected

The turboprop transports, the first turbine aircraft to see service in the Caribbean, will undoubtedly boost BWIA's traffic, which has been affected by the company's lack of modern planes; the present fleet comprises six Vikings and two (soon to be supplemented by a third) DC-3's, all 28-seaters. Equipment has always represented a problem for BWIA, due to the inadequate landing facilities on many of the islands which the company serves, although for the trunk routes, thanks to the U. S. airfield construction program in the 40's, the position is fairly satisfactory.

Having examined and rejected, at any rate temporarily, the use of amphibians and helicopters, BWIA is now reported to be interested in the Scottish Aviation Twin Pioneer, a project seemingly highly suitable for service to the minor West Indian islands by virtue of its size (16 passengers), performance (ground run of about 300 feet for take-off, 400 feet for landing), low direct operating cost (under two cents per seat-mile), and simple maintenance.

BWIA performs all its overhaul work (except engines) in well-equipped shops at Piarco Airport, Trinidad; all of BWIA's 230 technical personnel are locally recruited.

Weather in the Caribbean is usually right up to travel brochure standard, but there are days when IFR conditions prevail and when the area's lack

ONE OF BWIA's six Vickers Vikings which fly the carrier's trunk routes in the Caribbean is shown above. The company's re-equipment program involves another Vickers model—the turboprop Viscount, three of which will see service in 1955.

BWIA IS SOON TO RECEIVE a third DC-3 for use on "island-hopping" services. The two DC-3's now in operation were acquired in 1952 to replace Lockheed Lodestars, the type of equipment with which the airline started flying in 1940.

of navigational aids is acutely felt. BWIA's fatality-free record is a testimony to the skill of its pilots (at present totalling 30) who have to take the planes into fields with some of the world's worst approaches (Virgie, St. Lucia, is a prime example).

All BWIA personnel, particularly the sales staff, are enthusiastically awaiting the arrival of the first Viscount late next year. The turboprop planes will be used on the following routes:

- Port of Spain-Caracas-Kingston-Miami;
- Port of Spain-Barbados-San Juan-Bermuda;
- Nassau-Bermuda;
- Port of Spain-Georgetown.

In addition to including Bermuda in its network, BWIA plans to extend its operations to Havana and Mexico City, and possibly also between Nassau and Havana. With the introduction of new equipment and the expansion of its operations, BWIA is counting on increased business from the United States, and a big sales campaign is being initiated to make North America "BWIA conscious."

An interline sales team is going to pay particular attention to cooperation with non-competitive trunk route operators feeding into the Caribbean.

BWIA sales officials admit that the interim period until the Viscounts come into service will be difficult. Competition is becoming increasingly stiff in the Caribbean, with such companies as PAA, KLM, and Air France paralleling many BWIA routes, sometimes operating more modern equipment at lower fares.

A good example of this is the Port of Spain-San Juan route, where PAA has a tourist fare of $158 (round trip) and offers Constellation and DC-4 flights; BWIA has no tourist fares and charges the IATA rate of $172.80 for travel in Vikings and DC-3's.

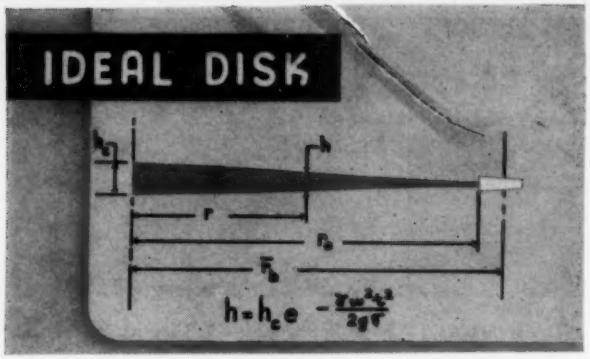
One of BWIA's biggest attractions for tourists is its island-hopping service linking Jamaica with Trinidad. In addition to getting a close view of some of the world's most beautiful scenery, the traveller also gets acquainted with the local people, since the flights are virtually inter-island bus services. (BWIA has one-stop flights for through passengers between Jamaica and Trinidad.)

BWIA enjoys an excellent reputation with the three million people of the British West Indies, and its policy of employing locally recruited personnel wherever possible has won approval throughout the islands. Economic circumstances prevent the vast majority of the islanders from patronizing any airline, but those who do travel have a natural preference for their own BWIA, the carrier that connects the Caribbean.

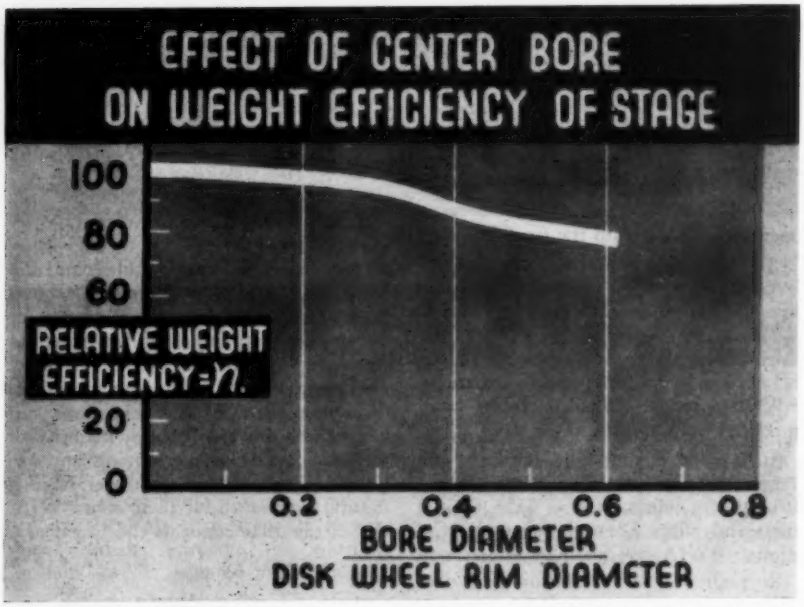
• • •

G[illegible]THERED IN DOWNTOWN PORT OF SPAIN are (left to ri[illegible]) C. Spurrier, assistant to the general manager of BWIA; C. [illegible]gostini, Trinidad's director of civil aviation: J. Dickson, B[illegible]A comptroller; B. P. O'Duffy, BWIA pilot and chairman of [illegible]e local branch of the British Air Line Pilots' Association; an[illegible]R. Barton, BWIA sales manager.

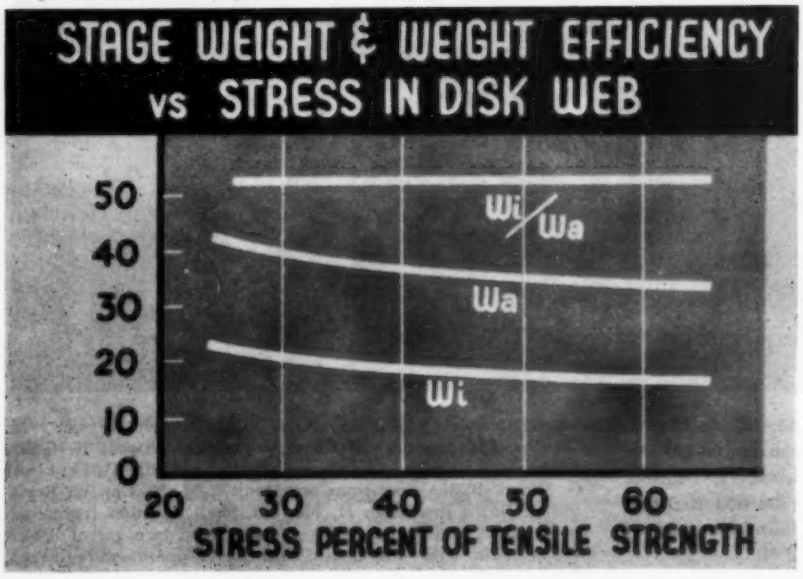
AT TRINIDAD'S PIARCO AIRPORT are (left to right) M. Whelan, BWIA acting station superintendent, Piarco; H. Cadiz, BWIA engineering superintendent; P. Kelshall, BWIA pilot; G. Wood, BWIA operations manager; R. M. Brown, Air Registration Board inspector; H. Newton, Shell Aviation representative; and C. Spurrier, assistant to the general manager of BWIA (John Rahr, who was absent when these photos were taken).



AXIAL THICKNESS of ideal disk (h) at radius (r) can be determined by means of the formula shown above, in which (e) is the natural base of logarithms, 2.71828; (δ) is the density of the disk material, in pounds per cubic inch; (ω) is the rotational speed of the disk, in radii per second; (r) is the radius in inches; and (σ) is the stress in the disk, in pounds per square inch. At the right, above, is a compressor wheel, showing the thickened rim, a flange, and the increased thickness necessitated by the center bore.



AS BORE DIAMETER increases, in proportion to rim diameter, weight efficiency drops. Below, efficiency gain due to increasing stress on web drops at higher levels.



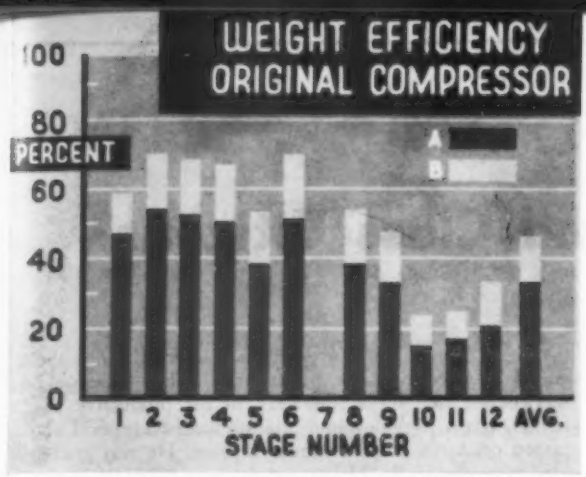
New Technique in Tu

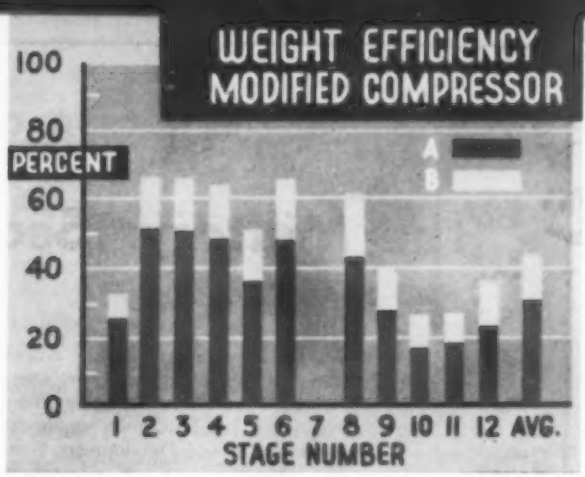
A NEW MEANS of estimating, comparing, and cutting down the weight of the disk wheels in jet engines has been put forward by General Electric engineer J. S. Alford in a paper prepared for the American Society of Mechanical Engineers. Since the weight of rotating parts in a typical axial-flow aircraft gas turbine accounts for more than one-third of the engine's total weight, the new approach may prove to be a valuable step toward paring down the specific weight of tomorrow's jet engines.

Basis of Alford's approach is the concept of "wheel weight efficiency": the theoretical weight of an ideal turbine wheel divided by the weight of an actual wheel carrying the same useful blade load. Actual wheels are currently running about twice as heavy as theoretical calculations would indicate. Taking this fact into account when developing new designs and relating it to a formula for the ideal weight will enable engineers to analyze present designs, compare them with each other to determine the weight advantages inherent in different configurations, and estimate more accurately the actual weight of proposed wheels.

The gap between theoretical and actual wheel weights, Alford points out, is produced by such factors as the following:

• **Blade fastenings:** Blades are attached in a variety of ways (see p. 37). Stresses set up by the methods of fastening are compensated for by thickening the rim, which therefore becomes less able to support itself and must be partially supported by thickened radii,





VARIATIONS in stage efficiencies are achieved by modification in type of coupling between disks. In both charts, "A" represents efficiencies when compared with an ideal disk in which the useful load is taken as the airfoil portion of blade only. "B" refers to efficiencies when radial steel band at rotor blade root is included in calculation of ideal weight.

Turbine Design

which increase the overall weight still more. The weight of the wheel rim is the most important factor in determining the weight efficiency. Weight efficiencies of comparable wheels may range from 25% to 50% due to differences in dead weight on the rim.

• **Center bores:** A hole bored in the center of the wheel increases the weight rather than lightening the wheel. This is because additional metal is added near the hole to reduce the high tangential stresses which result from it; these stresses would be approximately doubled in a disk of constant thickness.

• **Stress levels:** These can be raised in the web, reducing the thickness and saving weight, but the advantage diminishes at the higher stress levels.

• **Thermal stresses:** Heating and cooling of different parts of the disk through wide ranges of temperatures can set up stresses. In order to allow for these, weight may have to be added to the design.

• **Vibration:** As disks become thinner, in this drive to reduce weights, the danger of failure from vibration increases.

• **Torque transmittal:** Some way must be found to transmit from one wheel to the next the torque that has been produced. This must include not only the torque produced by the wheel in question, but also that transmitted from all the wheels preceding it. In addition, some way must be found to ensure even spacing between wheels. Flanges are sometimes used to serve both purposes at once, but these add weight.

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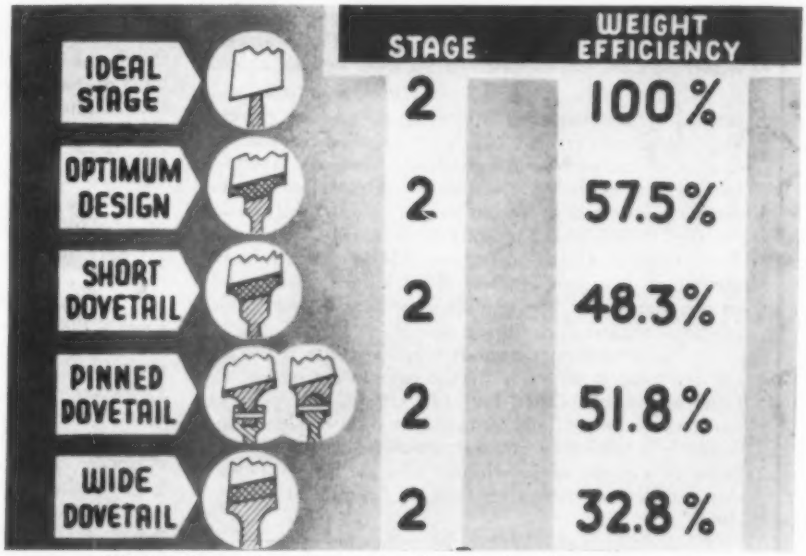
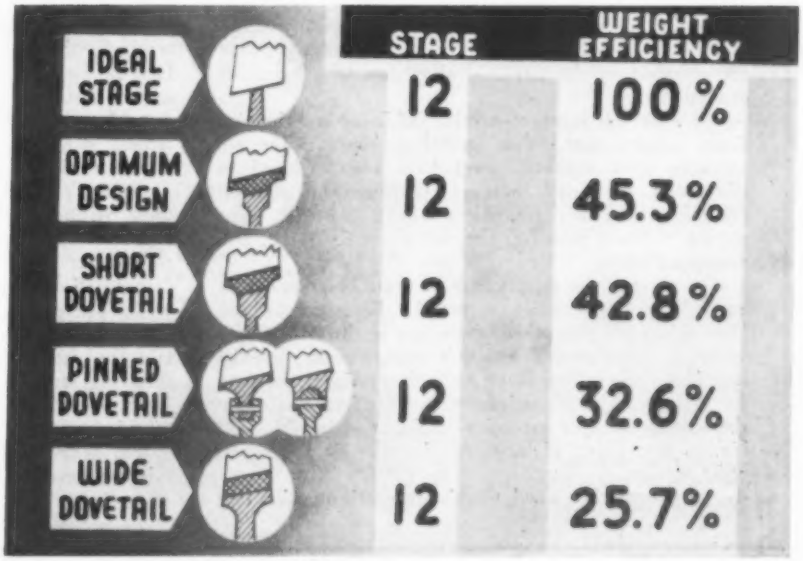


ADVANTAGES of various types of blade fastenings show up in two different stages of same compressor, as shown above and below.



The Military: Second Class Citizens?

THE AIR FORCE is losing one of its leading authorities in research, and he is leaving the service somewhat disgruntled. The dissatisfied and departing officer is Col. Oliver G. Haywood, Jr., head man of the research end of the Air Research and Development Command.

His present unhappiness stems not from the operational headaches and snafues that are ever present in today's complex military establishments, but from something much more basic to the technical, highly educated man in uniform: he dislikes many aspects of existing personnel policies, and so stated in his letter of resignation.

"As a senior officer, I must impose on able and patriotic subordinates conditions of second-class citizenship—conditions created largely by expediency, indifference, and discriminatory legislation," Colonel Haywood wrote. "The degradation of military status must lead to decline in the quality of our military leadership and in the effectiveness of our military establishment."

Colonel Haywood, whose title at ARDC headquarters in Baltimore is Chief of Scientific Research, said he was alarmed at "the attitude of persons in responsible positions toward the military service."

"Discriminatory legislation is voted into law without reference to or study by the committees which the Congress has established for such purpose. The political diatribes on 'waste' and similar matters are seldom objective and constitute political sensationalism at the expense of a group of individuals who are not in a position to defend themselves against unfounded accusations."

Strictly from the breadwinning viewpoint, Col. Haywood, observed that "the deteriorated financial status of professional military man has lowered his civilian social status to an extent inimical to the well-being of his family. To cite an example, the pay and allowances of a major 15 years ago gave him a purchasing power not equalled by the pay and allowance of a brigadier general today."

With 22 years of service behind him, the Air Force colonel noted that in recent years major advantages of a military career have been reduced or eliminated. He listed some as retirement for physical disability, voluntary retirement after 20 or 30 years service, military housing, dependent medical care, and numerous others.

What is the significance of these observations of one officer who dislikes present Air Force conditions? Does this mean that other officers are in the same frame of mind? The latter question is unanswerable, but the importance of Colonel Haywood's observations offer food for thought. The attractiveness of a military career on the management or executive level has a definite bearing on the caliber of leadership in our Air Force and other services.

In Colonel Haywood, there's not much question that the Air Force is losing a good man—one in which the public has considerable investment. The 41-year-old serviceman, not yet at the peak of his productive potential, has a high-powered educational background obtained primarily at government expense. He was graduated from the U. S. Military Academy in 1936, academically the No. 1 man in his class.

He later completed work on a Master's degree from Harvard University and a Doctorate of Science from Massachusetts Institute of Technology. But even more important, Dr. Haywood has accumulated an invaluable storehouse of Air Force technological knowledge through tours of duty with the Los Alamos Ecientific Laboratory, the Manhattan Engineer Project, the Atomic Energy Commission, the General Staff of the War Department, the War Plans Division at U. S. Air Force headquarters, and others.

It would appear from the record that the industry or educational institution which hires Col. Haywood, probably about September, will hire a good man by any standard.

The regrettable feature is that the Air Force, putting increased emphasis in recent years on the necessity of research and development for superior air power, must give up an important unit of brainpower in Col. Haywood. His action is, of course, not a signal for a mass exodus of Air Force intelligencia. It is indicative of a possible trend, however, and one that actually has been evidenced in recent years by top general officers who gave up the service for key industry positions.

No Sand in the Gears

Further assurance that the Korean truce would have little effect on present military aircraft manufacturing schedules was expressed at the Pentagon recently by a man very close to the purse strings of the Defense Department. Wilfred J. McNeil, assistant secretary of Defense (comptroller), emphasized that no schedules for either Air Force or Navy combat and support aircraft would be altered during the next year because of the truce.

Only anticipated changes, he indicated, would be those arising from engineering or manufacturing problems. He had a few of these "trouble items" in mind that could bring about contract revisions, but didn't care to discuss them.

There was some reassuring significance to his statement that "Defense Secretary Wilson wants to maintain the defense machine as a going concern without throwing sand into the gears." It indicated that top defense officials haven't forgotten the way the defense machine came to such an abrupt stop at the end of World War II and the complications that resulted from this five years later.

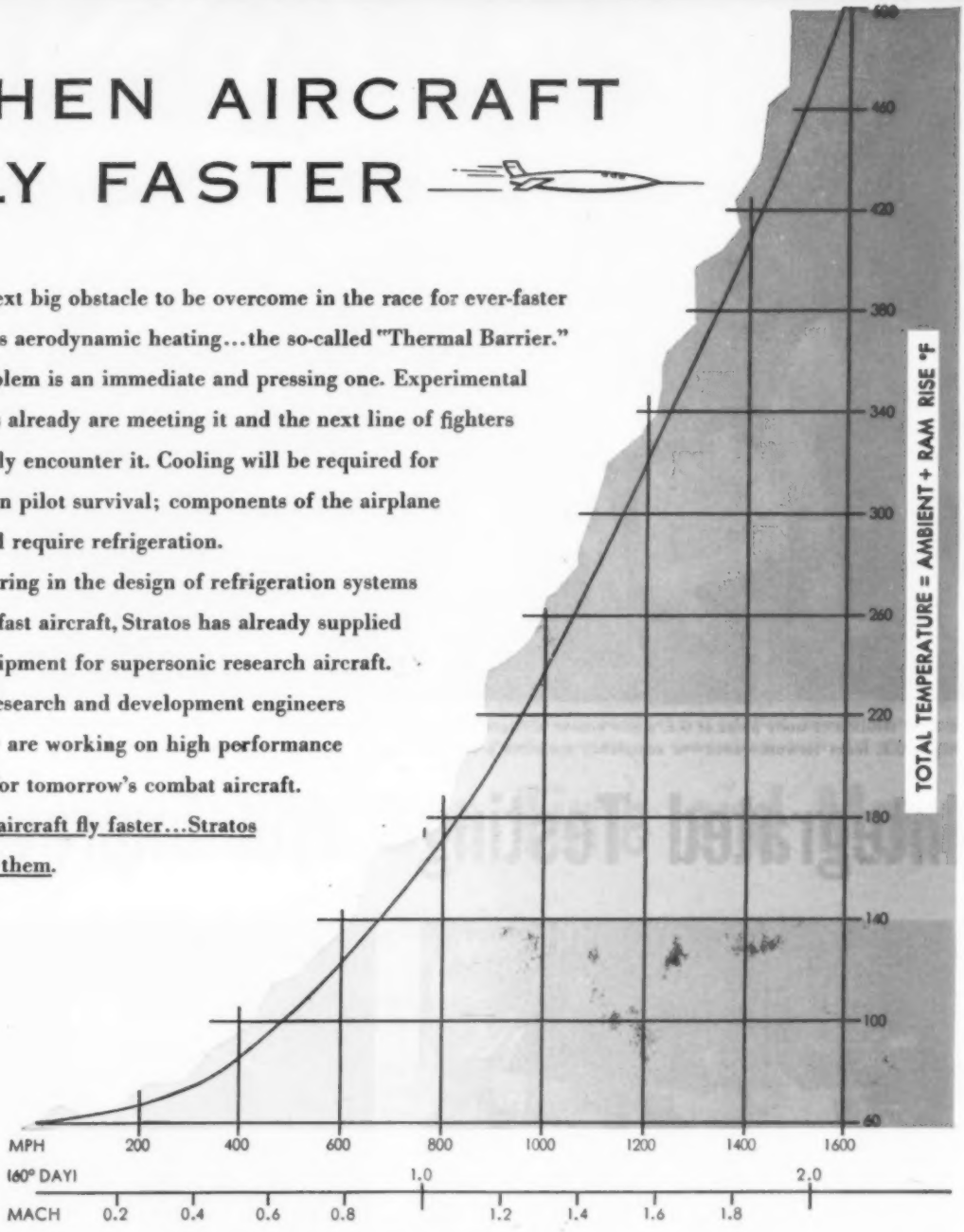
. . . HARRY S. BAER, JR.

WHEN AIRCRAFT FLY FASTER

The next big obstacle to be overcome in the race for ever-faster aircraft is aerodynamic heating...the so-called "Thermal Barrier." The problem is an immediate and pressing one. Experimental airplanes already are meeting it and the next line of fighters will surely encounter it. Cooling will be required for more than pilot survival; components of the airplane itself will require refrigeration.

Pioneering in the design of refrigeration systems for very fast aircraft, Stratos has already supplied such equipment for supersonic research aircraft. Stratos research and development engineers currently are working on high performance systems for tomorrow's combat aircraft.

When aircraft fly faster...Stratos will cool them.



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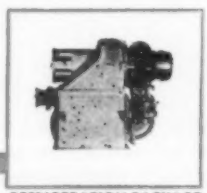
TYPICAL STRATOS PRODUCTS

EFRIGERATION TURBINE FOR F-86 "SABREJET"

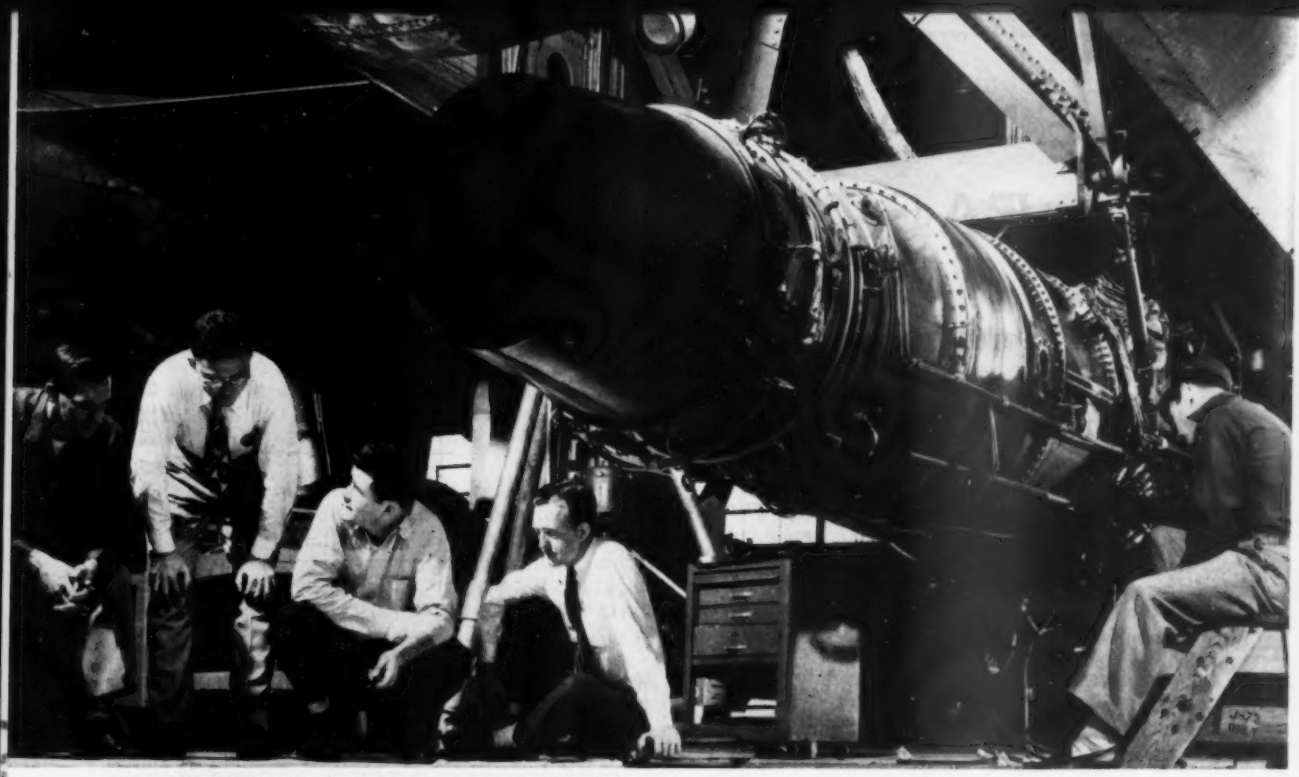


REFRIGERATION PACKAGE FOR B-47 "STRATOJET"

AIR-TURBINE DRIVE FOR OPERATING ACCESSORIES

BOOTSTRAP COOLING UNIT FOR TRANSPORT AIRCRAFT

CABIN SUPERCHARGER FOR TRANSPORT AIRCRAFT

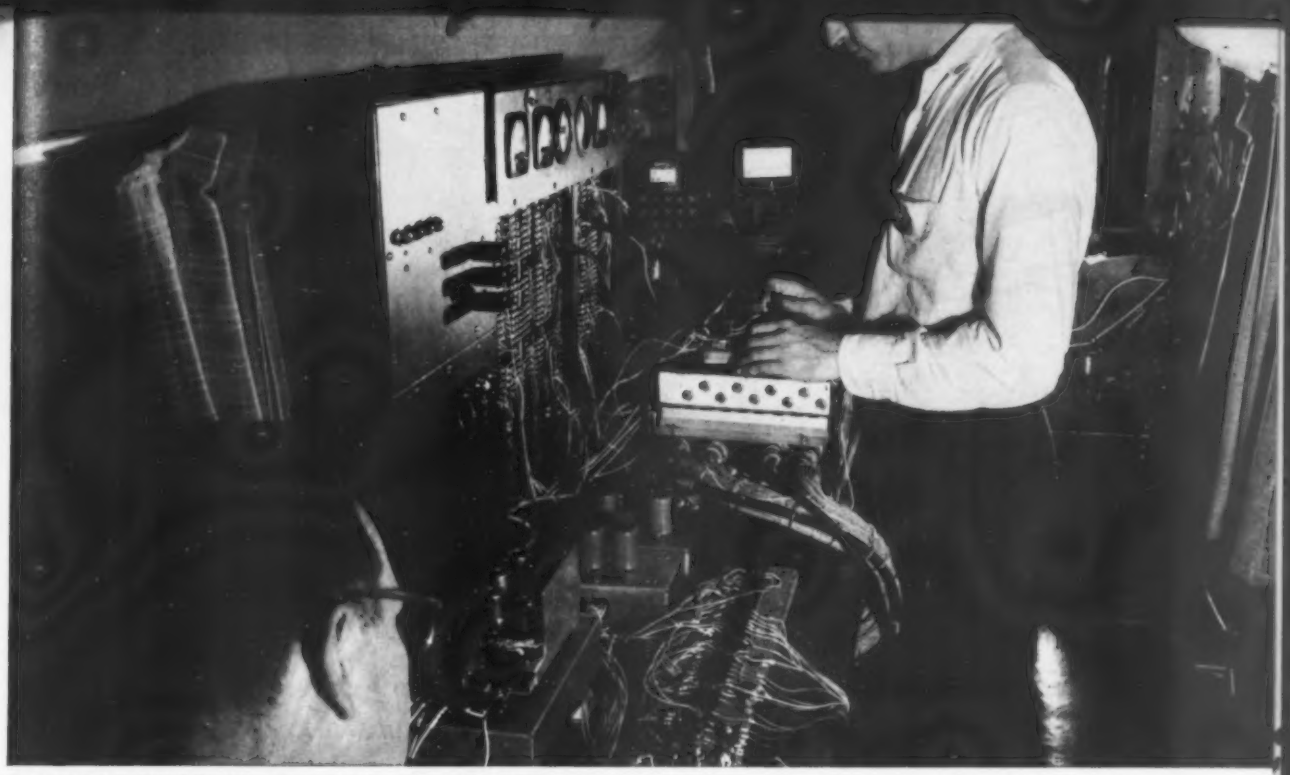


G-E JET ENGINEERS study plans of G.E.'s new engine at Flight Test Center in Schenectady, N. Y. The big powerplant is lowered from B-29 during flight. G.E. looks forward—soon—to completely *integrated* armament, engine, autopilot, and electrical system testing.

"Integrated Testing" Will Improve U. S. Fl

"X" EQUIPMENT gets frequent work-outs in hot planes like this F-86 Sabre, on bailment from Air Force. G-E armament, flight control experts are busy helping the Air Force develop co-ordinated Sunday punches for new U.S. jet planes.

PERISCOPE? No—part of a G-E radar-autopilot-armament system. The boom (installed in B-26) measures pitch and yaw signals for determination of system performance. Such devices help G-E engineers get pin-point accuracy in flight-testing new aviation gear



AUTOMATIC FLIGHT SYSTEMS tests are a daily part of G-E Flight Test Center routine. Advanced model (above) gets final check before take-off. G-E flight control is now installed in Douglas F3D-2 Skynights, Grumman F9F-5P Panthers, and the new swept-wing Grumman F9F-6P Cougar.

Flight Equipment, Save Time and Money

SCHENECTADY, N. Y.—A dramatic new type of equipment testing is taking shape at G.E.'s Flight Test Center. G-E engineers call it "integrated testing." What it adds up to, is this:

Instead of testing G-E aviation gear "piece-meal" (the old method), General Electric is now equipping planes that can evaluate, in the air, new G-E jet engines, new accessory turbines, autopilots, armament, and radar and electrical systems.

Integrated testing—the latest concept in modern aviation engineering—speeds G-E equipment development. Military and commercial customers will receive G-E products in less time . . . at less cost. The products will be better, too, because G-E engineers can know before delivery exactly how each item will affect the over-all performance of a new plane. Here's how the tests will work.

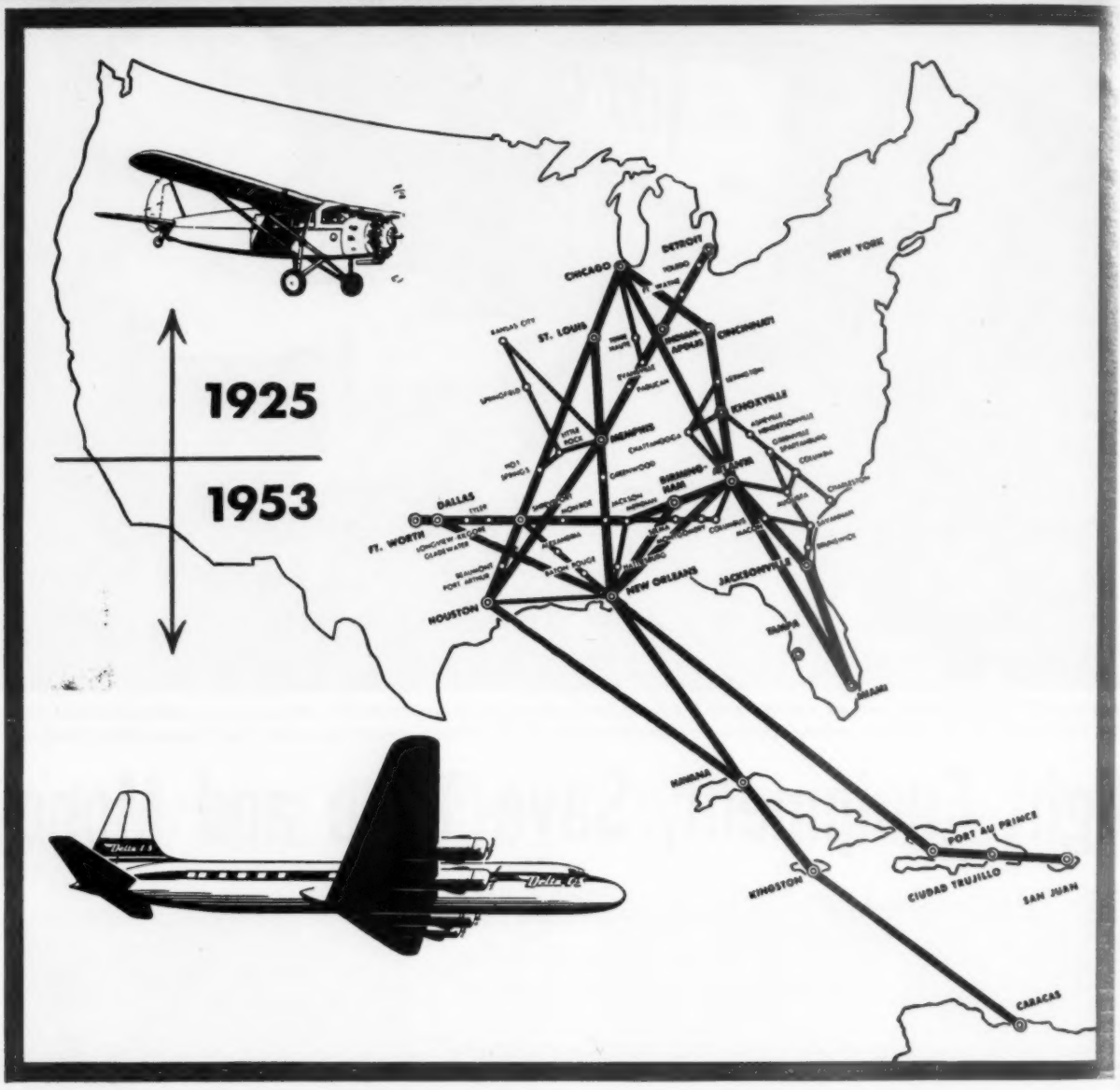
At Schenectady, N. Y., G.E. now maintains an 8-plane "test fleet" which in recent months has included a B-17, B-25, B-26, B-29, two B-45's, F-86's, F-94's, and an A3D. Some of G.E.'s current bailment-aircraft are modified to carry whole systems of test equipment. Jet engines are slung from bomb-bays . . . armament systems set up in the fuselage . . . autopilots and radar systems are mounted in the planes' noses.

Once in the air, G-E engineers "turn on" the test equipment to determine system-performance under flight conditions. Then while sensitive instruments measure responses, automatic recording equipment notes individual *component*-performance—later the results are passed to design engineers, who make whatever system-changes are needed to assure the best, over-all performance.

Procedures like these back up the G-E saying, "Progress is our most important product." The next time you need flight equipment, talk to G.E. first. For G-E equipment is built by men who know the needs of the aviation industry. *Section 210-79, General Electric, Schenectady 5, N. Y.*

GENERAL ELECTRIC

RADOME on tip of B-17 wing at Flight Test Center now carries special apparatus. But pods were originally designed for gunners and wing-tip observers.



Delta-C&S...two famous names...one fine future

Commercial aviation was a young industry when Esso began serving Delta in 1925. In those times flights between Dallas and Atlanta required the whole day. Now Delta-C&S DC-6s complete this flight in about three hours as a small segment of a system which has grown to be the nation's fifth largest air carrier. Delta management has consistently promoted progressive policies that have been to the highest credit of the air transport industry. One result is the new company which now serves 61 cities in the U.S.A. and Caribbean area with routes totaling 9,508 miles.

We've been making progress too. Over the years our research and development programs have produced new and better aviation petroleum products — some of which contributed largely to the progress of air transport, and we hope to Delta.

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We are happy because of past associations and look forward to future opportunities to serve...HAPPY FLYING, DELTA-C&S

MAKING HAY, and money, at Lancaster, Pa. A neighboring manufacturer of farm machinery uses 169 airport acres as a testing ground, sells the hay to farmers, and turns over net profit to the airport. Net last year: $1200.

How to Supplement Airport Revenues

Non-aviation sources may mean anything from hayfields to hairdressers, but watch it, consultant warns.

By WALTER A. KILRAIN

THE AIRPORT OPERATOR, like his fellow businessmen everywhere, faces the problem of making money. Unlike a good many of his colleagues, however, he also faces a set of rather unusual handicaps:

• **He must provide** services that are needed by the traveling public, such as rest rooms, taxis, parking lots, restaurants, and telephones;

• **He must provide** these in an atmosphere and in a manner that will provoke civic pride in the hearts of the taxpayers who are footing the bill;

Four to One

• **He must provide** facilities and services for the non-traveling public, the members of which may decide to use the airport for civic affairs of various sorts, even though they may never set foot in an airplane. These may outnumber the flying public four to one.

To the credit of the airport operator, he has found a good many solutions to his problems. Some work in most places, others are artfully tailored to the local situation. Not every airport could offer to store and repair sailboats, or present an attractive site for an iron foundry, as the CAA suggests in a brochure entitled "Building an Income at the Airport."

One thing, however, all such projects should have in common, according to Leigh Fisher, airport financial consultant: they should make money.

"A non-aviation revenue should not be considered," says Fisher, "if there is *any* possibility of net loss occurring. If there is any doubt, consider that public funds are then used to promote a commercial type of business competitive with other business operations in the area, and this, basically, constitutes a misuse of public funds."

There may be good reason for wanting a concession or service that can not be trusted to make money. It may be needed for convenience: almost every airport needs a restaurant of some sort. Or it may be dictated by civic pride: almost any administration is eager to have a restaurant that is bigger, better, and flashier than the one in the next city. Fisher, who has worked on some 25 terminal buildings, remarks that "usually the food service areas actually built cannot be justified by the gross volume of business available."

Getting down to cases, Fisher points out why they can't be justified. With construction costs assumed at approximately $30 per square foot and half the tab being picked up by the Federal Government, a restaurant with a public serving area of 2500 square feet would have to ring up annual sales of over a quarter of a million dollars just to permit the airport to break even on building costs and collect a five-per-cent-of-gross occupancy charge.

If the Federal Government were not chipping in, annual business would have to reach $375,000, as a bare minimum.

Fisher therefore recommends that

VENDING MACHINES, distributing everything from ice cubes to telegrams, can be easy source of revenue. At left, machine to sell greeting cards.

MILLIONS OF HOURS TO

DEVELOP THE J-57 TURBOJET

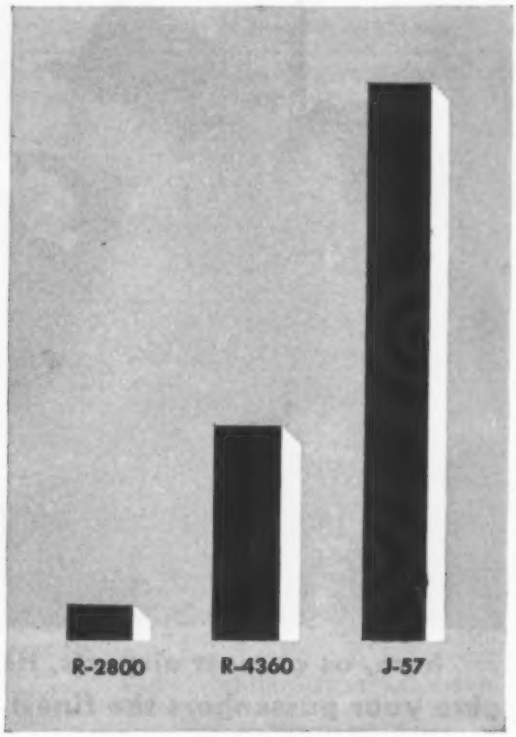
Models and mockups of detail parts and assemblies aid development engineers in design improvement work.

Since World War II, the aircraft industry has gone through a technical revolution. Advanced turbojet engines now provide aircraft with flight capabilities considered fantastic only a few short years ago.

But many men, even those close to aviation, do not appreciate the vast effort needed to fulfill the promise of truly great engine performance inherent in these turbojet designs.

As just one measure of that task, take the engineering effort required to bring Pratt & Whitney Aircraft's mighty J-57 turbojet to its present stage of development. So great were the technical problems that almost three times as many design and development man-hours were needed for the J-57 as for the world's most powerful aircraft piston engine, the 28-cylinder R-4360 Wasp Major . . . and almost *fifteen times* as many man-hours as for the R-2800 Double Wasp, one of the most powerful piston engines of World War II.

While design and development time is only one phase of jet engine production, it illustrates an entire industry problem. It also helps demonstrate why—today as always —*dependable engines take time to build.*



The above chart illustrates the tremendous increase in design and development man-hour requirements from the 18-cylinder R-2800 Double Wasp piston engine to the mighty axial-flow jet, the J-57. Design and development is, of course, only one phase in engine production. But the relationships illustrated here are typical of all phases of manufacturing the advanced, complex aircraft engines required today.

Pratt & Whitney Aircraft

MAIN OFFICE AND PLANT: EAST HARTFORD, CONNECTICUT
BRANCH PLANTS: NORTH HAVEN, SOUTHINGTON, MERIDEN

ONE OF THE FOUR DIVISIONS OF UNITED AIRCRAFT CORPORATION

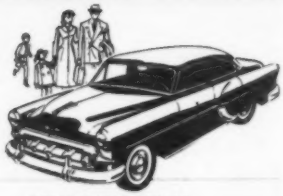
In San Francisco, Cal., too, air travelers can step from the plane into a car from Hertz

here, as at most airports, HERTZ is ready to give your passengers the finest car rental service!

Yes, the Hertz station at the airport in San Francisco, California, is just one example of the excellent facilities and superior service offered by Hertz stations everywhere. For your passengers, who expect the best, only Hertz offers them *all* the advantages of car rental service.

Here are the reasons why HERTZ SERVICE is better for the air lines:

- Hertz, and only Hertz, can and does deliver cars to airports in more than 500 cities. Hertz maintains stations right at or adjacent to the airport in most key cities.
- Hertz with 29 years' car rental experience is dependable. It is the world's largest and only international car rental service—uniformly conducted in more than 500 cities throughout the United States, Canada, Alaska, Hawaii, the Virgin Islands, Cuba, Haiti, Mexico, Great Britain, Ireland and Switzerland.
- The Hertz national advertising program consisting of full page advertisements throughout the year in Life, Saturday Evening Post, Collier's, Holiday, National Geographic, Time, Newsweek, and U. S. News & World Report, promotes the Plane-Auto Travel Plan, creates new air travelers, puts new business on your planes and builds Hertz popularity.
- Your passengers, reserving cars from Hertz before they take off, can be sure of fine, new cars that are clean and properly conditioned. All gasoline and oil, Public Liability, Property Damage, Fire and Theft Insurance and $100.00 deductible collision protection are included in the low rate—at no extra cost.
- Your passengers can rent from Hertz day or night for any length of time and enjoy quick, courteous, efficient service. Hertz National Courtesy Cards and International Charge Cards are carried by more than a million and a half men and women and are honored at all Hertz stations.



IMPORTANT!

Encourage your ticket sellers and information clerks to always recommend Hertz Service to your customers. It's the world's finest car rental service . . . and promotion of Hertz Service will pay off in more customer good will and extra business for you. Also, promote this popular service in your national and local advertising, direct mail and counter literature, and other advertising programs.

- Air Travel Cards—are honored at all Hertz stations. They serve as identification, eliminate deposit requirements and provide credit privileges if desired.

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HERTZ *Rent-A-Car* **SYSTEM** Dept. C83, 218 S. Wabash Ave., Chicago 4, Ill., Phone: WEbster 9-5165

airport-planning city fathers temper their civic pride with arithmetic. If the operation is not likely to make money, he advises, face that fact at the beginning and charge it up to convenience; don't think of it wistfully as a non-aviation revenue, only to register surprise and chagrin when it later turns out to be running in the red.

Turning to the brighter side of the financial picture, Fisher offers some sources that can be expected to produce revenue. Among them:

• **Coin machines.** These can be a source of net profit with very little trouble, if they are protected against vandalism (try keeping them in a separate room, which can be locked during off hours) and provided that their contents (liquids, paper cups, bottles, etc.) don't create new maintenance and janitorial problems.

• **Display cases.** Here over 75% of the earnings are net profit. Using built-in or hung-on cases along the main lines of traffic flow, almost no additional maintenance problems are involved.

Down on the Farm

• **Farming.** In general, leave it to farmers: let them work your excess land (for a net profit to you), but keep out of it yourself. "When airport management enters the farming activity," observes Fisher, "a net loss is usually the true accounting result, even though many times the loss is hidden by bookkeeping transfers."

• **Parking meters.** They can be a touchy subject. In smaller cities the citizens may object to meters in the parking lot, even though they will accept a few directly in front of the terminal. Watch out for a drop in food sales, too, in such locations, if you put a price on time spent in the lot. To justify a manned parking lot, a volume of 350,000 to 400,000 passengers a year is needed. Even with this volume, the safest bet is to allow a concessionnaire to cope with the problems of the operation, turning over a net profit.

• **Limousines, Cabs, and Auto Rental.** Sure sources of income almost anywhere. Fisher claims airports with fewer than 15,000 passengers arriving and departing annually have made money from these operations.

Ground leases can also be a source of income, but only if the local situation is well adapted to them. Fisher cites a commercial development at Evansville, Ind., where a gas station has been built and a hotel is under construction. Key to the prospects for success right past the airport runs U.S. 41, the main highway from Chicago to Florida.

In general, Fisher warns, such undertakings are risky, involving as they do a large outlay of capital. It is safer for the airport to lease the land to private enterprise than to attempt to do the job itself. In this way it will not only be relatively sure of its profit, but will avoid entering into competition with private investment.

An often overlooked advantage of such developments near the airport is that they may bring new customers to the concessions which the airport is operating, particularly the restaurant.

Once the airport has decided upon which concessions are likely to prove profitable, there is the problem of just where to put them. The planner must hit a happy medium: many purchases are made on impulse, so it behooves him not to hide them away; but the public may resent being forced to run a virtual obstacle course through the flower shop and snack bar before it can buy a seat on an airplane.

Not all who come to the airport, of course, do so to buy such tickets. The CAA estimates that total airport traffic runs between 1.5 and four times the number of airplane passengers, with the higher percentage for the smaller airports.

Between the travellers and the non-travellers, the airport manager should be able to add a few dollars to his income by using his knowledge of the needs of his community, a little imagination, and some sober, unspectacular arithmetic. • • •

Ideas on Making Money

Almost anything may become a source of income at an airport. Above, a truck-towed sight-seeing caravan gathers in the Swiss francs at Zurich. Below, some of the more thought-provoking suggestions in a CAA booklet, "Building an Income Program at the Airport."

Awning manufacturer
Badminton courts
Baby lounge
Bottling plant
Dance studio
Foundry
Incinerator service
Mannequins and models
Motorcycle race track
Oil well company
Rifle range
Sailboat storage and repair
Turkey ranch
Winery

Weesner Interests Buy Control of Riddle

Control of Riddle Airlines, certificated U. S.-Puerto Rico all-cargo line, has been acquired by a group of Miami and New York businessmen headed by R. Paul Weesner, formerly an executive and top stockholder of Resort Airlines, Lake Central Airlines, and Nationwide Air Transport.

Three largest holdings in Riddle are Weesner, 35%; T. E. Bragg, New York industrialist, 20%; and George Martin, Miami insurance executive, 15%. Remaining 30% is divided between W. R. Boyd, new president of the company, Benjamin Turner, Fletcher Godfrey, J. A. Perkins, Marie Logie, William Cauley, and Philip Mann.

Weesner said his Riddle interest is solely from an investor's standpoint. He expressed "complete confidence" in the new management, headed by Boyd, former president of All-American Airways, Miami non-scheduled carrier.

Future public financing is planned in order to secure modern long-range cargo planes, with Constellations and DC-6's among types being considered, Weesner stated. He added that "we're not even close to a merger" with U. S. Airlines, domestic cargo line, although any merger would be studied if the result would conform to a sound cargo transport network.

Riddle was founded by John Paul Riddle, who headed it until May, 1953, when Jean Helvey, who had been with the line since the beginning, became president. He was replaced a few weeks ago by Boyd.

TOMORROW'S AIRCRAFT:

"Airborne electrical systems are subject to severe demands"

The current standardization work on a-c control panels is the latest development by Westinghouse in aircraft electrical systems. This development is aimed toward an automatic control system, including paralleling and synchronizing of the generator. These automatic systems will be particularly valuable for aircraft having a limited crew—and will ease crew duties and provide more reliability.

Imagine an electrical system where circuits are next to a tank car of gasoline! Where temperatures range from 160 degrees to minus 67 degrees F and change rapidly. Where the whole system is subject to vibrational stresses. Finally, add routine functions of accommodating sudden load changes, system surges, and of meeting switching requirements. These are the severe problems that Westinghouse designers of modern aircraft power systems have had to overcome.

For more than 36 years, Westinghouse has been producing high-quality a-c and d-c equipment to provide continuity of service for aircraft. In fact, Westinghouse pioneered the research, development, and production of a-c systems . . . alternators that provide power to start engines, operate pumps for heating and ventilating, flight control, lighting, and electronic devices. And to complete the electrical system Westinghouse also supplies regulators, breakers, generators, control panels, motors, hoists, rectifiers and transformers. All these products have been tried, tested, proved by millions of airborne kilowatt-hours.

You'll find this same background of research, development, and experience in the Westinghouse approach and solution to many current aviation problems. Call your Westinghouse office, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-91001

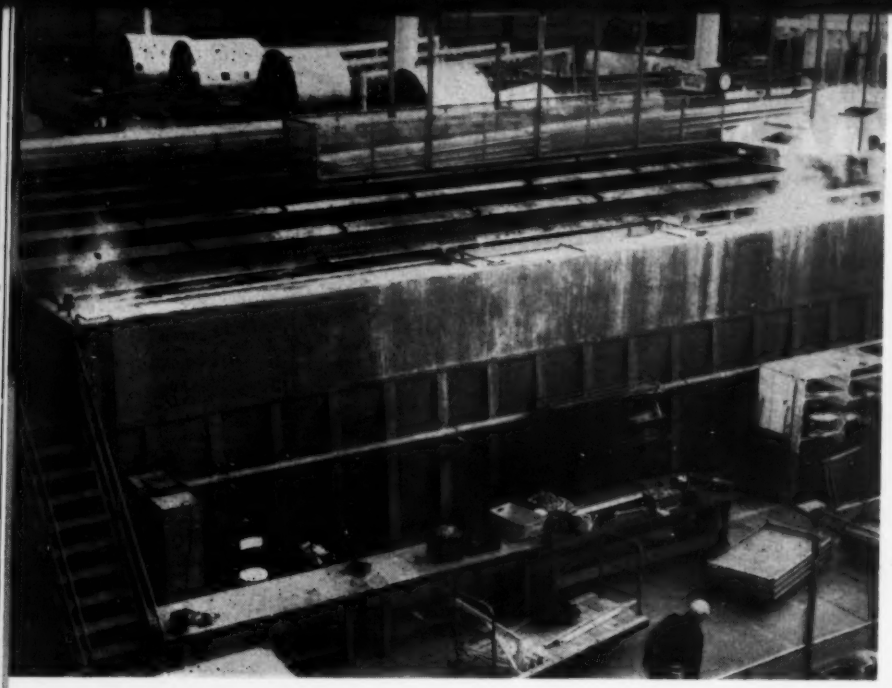
THE SCOPE OF WESTINGHOUSE IN AVIATION

Basic aircraft systems
Turbojet Engines, Fire Control, Radar, Autopilots, Communication Equipment and Electrical Systems.

Ground equipment
Wind Tunnels, Airport Lighting, Industrial Plant Apparatus.

Airborne system components
Transformers, Rectifiers, Instruments, Gyro-motors, Temperature Control Panels, Generating Equipment and System Controls, Circuit Breakers, Contactors, Motors, Actuators and Hoists, Electronic Tubes, Magamps, Micarta®.

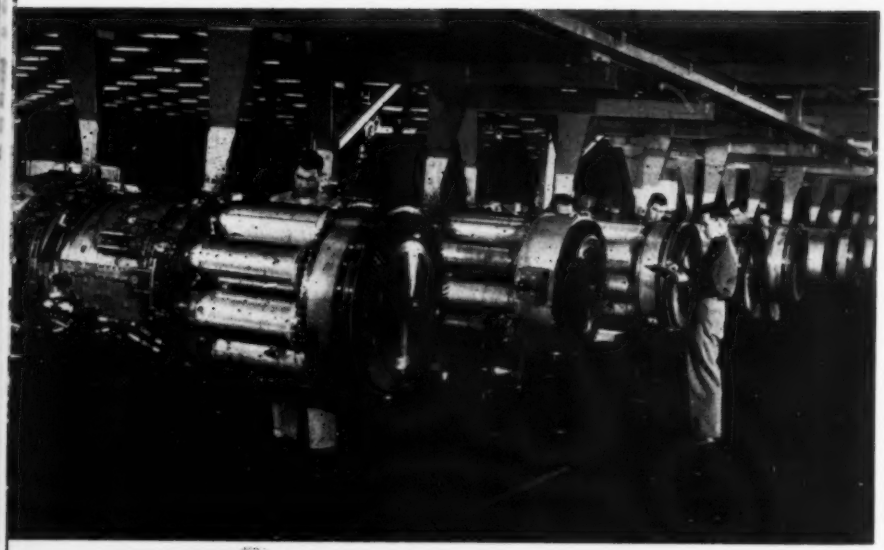
YOU CAN BE SURE...IF IT'S
Westinghouse



Half the time has been trimmed off the schedule for preparing and cleaning aluminum prior to painting through the use of a chemical "bathtub" at Lockheed. Overhead crane dunks parts into chromodize-iridite tanks, lined with Goodrich Koroseal, where a paint-adhesive film is deposited.

Production Lines

Cool reception. Unit of an electronic computer comes out of the weather laboratory at North American Aviation's electromechanical engineering department at Downey, Calif. Equipment is tested there for use in the company's guided missile program.



Grape arbor is the name given to this section of General Electric's jet engine plant near Cincinnati, where engines hang from overhead conveyors. The completely mechanized assembly line speeds production of J47's.

ANNOUNCING

THE NEW

RYAN FIREBEE

HIGH-PERFORMANCE JET TARGET

Latest product of creative Ryan aircraft engineering and manufacturing is the FIREBEE, the newest high-speed, high-altitude jet-powered aerial target plane. The FIREBEE is remote controlled and recoverable by parachute.

This new advance-type swept-wing jet aircraft has been developed as a jointly sponsored project of the Air Force, Army and Navy. It provides all the Armed Forces with an efficient answer to the vital need for a jet target with the performance characteristics of modern fighter aircraft.

The FIREBEE is another example in the long list of Ryan contributions to the advancement of aeronautical science.

RYAN
AERONAUTICAL COMPANY
AIRCRAFT AND AERONAUTICAL PRODUCTS

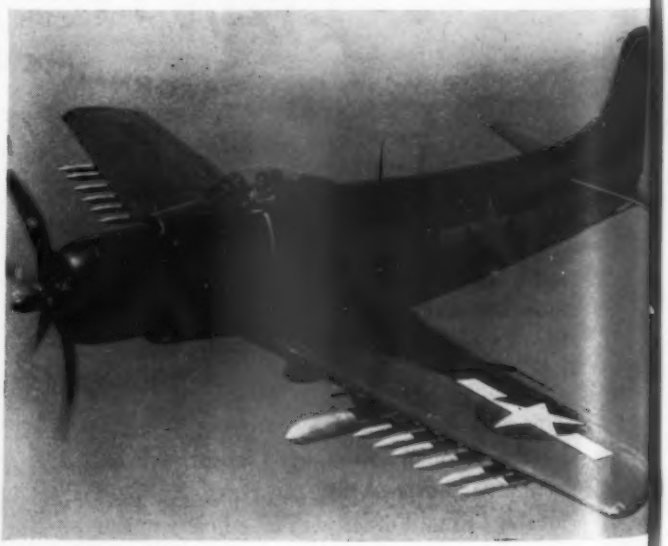
R AN AERONAUTICAL COMPANY • LINDBERGH FIELD • SAN DIEGO 12, CALIFORNIA

First photo of ground launching of Ryan's "Firebee" pilotless jet plane, designed for use as a high-speed target. Rocket engine boosts the Firebee into the air after a run along a 60-foot rail. Fairchild J44 jet engine then takes over to provide propulsion.

The Military Scene

Rocket tests are run through by Northrop's F-89D, all-weather interceptor. Folding-fin, 2.75" air-to-air rockets are carried in wing-tip pods. The Scorpion is powered by two Allison J35-A-33A jet engines with afterburners.

New flotation gear is tried out on a Piasecki H-21. The doughnut floats, as used by the USAF Air Rescue Service, can be left uninflated in position around the normal landing gear until the helicopter is ready to land. They can be jettisoned after take-off to reduce drag during the return trip.



Atomic bombs can be carried by Douglas AD-4B single-place attack planes, according to E. H. Heinemann, chief engineer for Douglas Aircraft. The A-bomb Skyraiders, among the first of the smaller planes to be so equipped, have been in operation aboard Navy carriers for almost a year. In recent tests a similar model carried a record load of 10,500 pounds of bombs, plus 1444 pounds of other armament.

West Coast Talk

By Fred S. Hunter

LOCKHEED is now coating interiors of the fuselage structure of its Super Constellation at the propeller line with copious quantities of a goop-like substance which is generally referred to in the aircraft industry as "dum-dum." It's the same stuff your motor car dealer uses to undercoat your new car—at a slight extra charge—to quiet the rattles. The muffling effect of the Wright Turbo-Compound engine's recovery system lowers exhaust noises in the New Super Constellations and Douglas DC-7's. But the propellers, absorbing more hosepower, bounce more energy against the fuselage, making forward portions of the cabin noisier unless strong counter measures are taken. It's this propeller problem that prompted Douglas to take a weight penalty on the use of stainless steel at the propeller line in the DC-7 fuselage structure to soak up the noise.

• •

If the increase to 3250 hp in the Turbo-Compounds aggravates the propeller noise problem in the cabin, what happens when P & W's 5600 hp turboprop T34's start turning those huge Hamilton Standard propellers, whose blades are two feet wide, on the R7V-2 version of the Super Constellation which Lockheed is now putting together for the Navy? Looks like the "dum-dum" business might be pretty good.

• •

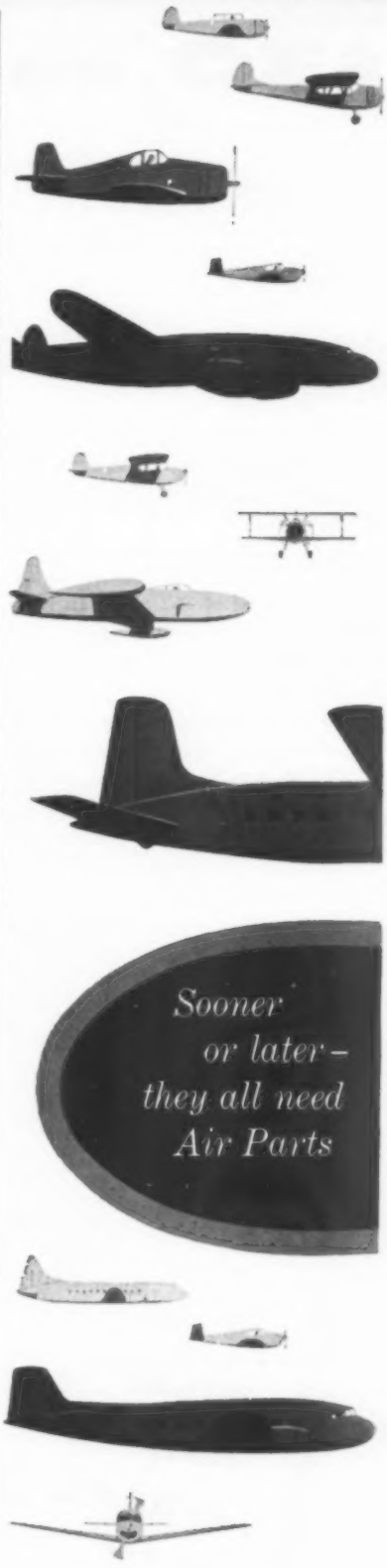
Sam Shannon, Convair's chief of experimental flight at San Diego, is the taciturn type. Doesn't talk much. Neither is he what you might call demonstrative or emotional. In one of the early flights of the revolutionary XF2Y-1 Sea-Dart Sam hit the water real hard in a landing. The outraged Sea-Dart bounced high on its hydro-skis, but remained intact and eventually settled down in the water. The Convair engineering and ground crew following the flight waited breathlessly for a blast to hit their head sets reflecting the vocal explosion they felt sure would be taking place in the cockpit. But all that came over the open mike from Shannon was a moment of deep silence, then "Gee whiz!" Not another word. (If **Jack Naish** tells you this story and quotes Sam as saying, "Oh, brother!" it's an example of how stories get garbled in re-telling.)

• •

Latest jet transport bulletins . . . Douglas may switch from the familiar tubular-type fuselage patterned after the DC-6 series to a figure-eight fuselage for the DC-8. But it still plans individual pod installations for the engines . . . Hall Hibbard admits Lockheed isn't talking afterburners for take-off boost any more, because of the noise element, and is now talking about water injection to compensate for temperature on its jet transport . . . Willis Hawkins, chief of preliminary design for Lockheed, has it figured out Lockheed has drawn a jet transport design (different, at least in some respects) on the average of every seven working days since 1944.

• •

WEST COAST MISCELLANY—Convair has made a deal with the Navy to establish **flight test facilities** for its forthcoming Air Force F-102 at the Miramar Naval Air Station just outside San Diego, but it is good for only two years and after that the San Diego manufacturer may have to join Lockheed, North American, and Northrop at Palmdale . . . **Nels Beard,** assistant to **Arthur C. Raymond,** vice president of engineering at Douglas, got his 25-year-pin the other day . . . For crews, Western Air Lines' one-stop Los Angeles-Minneapolis run with DC-6B's beats any of the Pacific Coast runs and there's where you'll now find the line's senior pilots like **Sam Moser, Ken Turner, Pat Carlson, Fred Kelly, Ray Ellinghouse, Floyd Aker and Russ Lund** . . . Douglas El Segundo had to **take a J40 out of its A3D** to get its F4D off to Patuxent, the engine situation being what it is.



AIR-PARTS INC.
America's PIONEER Distributor
of Aeronautical Supplies.

$30,000,000

in new equipment for Delta C&S System

DC-7

362 mph cruising

$26,100 per seat

CONVAIR

270 mph cruising

$13,650 per seat

DC-3

170 mph cruising

$5,700 per seat

Air Fare Per Mile

5½¢

Air Coach 4¢

When Delta inaugurated DC-3 service at 170 miles an hour, the capital investment was about $5,700 per seat.

The 20 new Convairs now being delivered to Delta-C&S will carry you a hundred miles an hour faster than a DC-3 and each of their 44 seats represents an investment of $13,650, a total of $12,000.000.

Coming early in 1954 are the first of ten new turbo-compound powered DC-7's with a top speed of 410 and a cruising speed of 362 miles an hour. Proportionately each of the 69 super-comfort, airfoam cushioned seats cost $26,100, or a total of nearly $18,000,000 for the ten planes.

This new 30-plane, $30,000,000 fleet supplements the present Delta-C&S luxury fleet of 43 DC-6's, Constellations and DC-3's.

Delta-C&S is proud to be able to provide the fastest and finest equipment in America at substantially the same rate per passenger-mile as pre-war—even less in the case of air coaches—one of the economic miracles of modern science and operation.

Where do "Aviation People" Vacation?

Folks in this industry are among the first to discover new, unusual and economical places. That's why these Delta-C&S points are favorites of "Those who know travel best".

MIAMI — For fun, fishing and hotel facilities; direct from Chicago.

HAVANA — Wonderful new hotels, night life, via New Orleans.

JAMAICA — Incomparable north shore and Montego Bay hotels, beaches.

HAITI — Discovery of the year, superb hotels, scenery, excursions.

Delta-C&S AIR LINES

General Offices: Atlanta, Ga.

Even if you're travelling on a pass Delta-C&S will be glad to arrange hotel and ground tours at package vacation rates.

How Used Aircraft Prices Compare

(Following figures are close approximations. Price ranges depend on condition of aircraft, locale of sale, etc.)

Model	Original Price	Current Price	Current Price with Std. Conversion
DC-3	$120,000	$50,000-65,000	$125,000-150,000
Lockheed Lodestar (P&W engines)	100,000	35,000-50,000	80,000-100,000
Grumman Mallard	95,000	125,000-135,000	150,000-160,000
Twin Beechcraft	60,440-62,500	25,000-50,000	30,000-65,000
Lockheed Ventura	110,000	35,000-50,000	150,000-200,000
Douglas B-23	155,300	N.A.	175,000
NAA B-25	135,000	75,000	125,000-160,000
Douglas A-26	175,000	85,000	175,000-185,000
Navion: NAA	6,100	5,000	.....
Ryan	N.A.	7,500-15,000	.....
Beech Bonanza	7,345	6,000	.....

N. A.: Not available.

Used Aircraft: A Buyer's Market Now

End of 'war scare' seen cause of shift; Douglas DC-4 most in demand; Mallards outprice DC-3's.

By Lois C. Philmus

USED AIRCRAFT dealers report that the market is softening this year, turning from a "seller's" to a "buyer's" market, according to a recent survey of the group conducted by American Aviation. Largest customers for used aircraft are the executive aircraft owners and the foreign consumers.

The Babb Company of Newark, N. J., reports that the market was at its peak after the end of World War II and after the beginning of hostilities in Korea. The Aviation International Co. of Washington, D. C., states that the change to the buyer's market is evident "as war scare diminishes." Trade-Ayer Company of Linden, N. Y., attributes the instability of the market at present "to unsettled international situation and the tax program."

The aircraft in the greatest demand, the survey finds, is the DC-4, followed by "good" DC-3's and Lodestars, all at "reasonable prices." During 1946-1949 and 1951-1952, demand exceeded supply in all types, both multi- and single-engine, but the dealers report that there are more aircraft available now that are not selling quickly.

The used aircraft dealers are divided into two groups—those that just act as brokers and those that sell "package" deals, which include standard and custom conversions in the selling price.

Brokers' commissions vary—some receive five per cent; some receive 10%, up to $50,000, graduated down to five per cent and going as low as three per cent, as for a very large sale; some report no standard is set, commissions negotiable on individual basis. However, about 65% of the respondents report an average commission of five per cent.

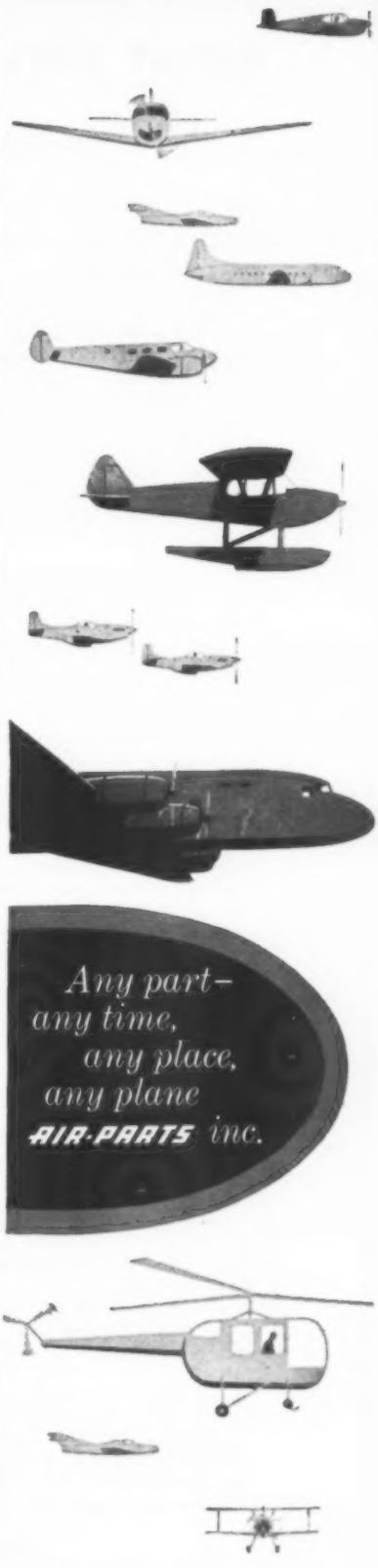
About 65% of the survey respondents report that they usually sell aircraft after conversion work has been accomplished, and the remainder sell the aircraft in the condition acquired, unless the customer requests an engine change or overhaul. Of the group selling "package conversions" about 50% subcontract and 50% do their own.

The conversions include either engine changes (usually to more powerful horsepower) or at least overhauling engine to zero time; propeller changes; configuration modifications; and installations of new interiors, particularly for the executive aircraft group.

Two of the companies responding state that their transactions are 100% with the corporate owners. Trade-Ayer reports that 40% is with this group and 45% export, with the balance to domestic military and private owners. Grand Central Aircraft of Glendale is one of the companies that works 100% with the corporate group.

It is difficult to draw cost comparisons between today's market and the prices charged during the peak periods, since there were day-to-day fluctuations during the "seller's market." But today's prices fall into two categories—for aircraft "as is" and for aircraft sold with standard modifications.

Certain inequities exist in today's prices, as is witnessed by a comparison of the DC-3 and Grumman Mallard. In the spring of 1947, the Mallard was selling for $95,000 off the line and the DC-3 for $120,000. Today, a used Mallard is selling for as much as $125,000 and as



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GREAT AIRLINES

From Little Airlines Grow

and become GREAT
assets to the commercial and military
might of our Nation!

NORTH AMERICAN AIRLINES too is a splendid example of free enterprise in action, beginning only a few years ago, at the end of World War II, when Jim Fischgrund and Stan Weiss started Standard Airlines with two DC-3's and Red Hart and Jack Lewin started Viking Airlines with three additional DC-3's. Backed only by private capital and stern determination to render a vital new service to the Nation and its citizens, these carriers pioneered low fare air coach service.

In those days, CAB flight frequency requirements were considerably less stringent than today, and the companies prospered without mail pay or subsidy. For the most part their passengers were those who had previously been unable to afford the higher cost, luxury service then in existence and generally believed to be the only economically feasible air transport service. In 1949 these companies joined forces to provide improved passenger service and formed North American Aircoach System, Inc.

During the summer of 1951, the Senate Small Business Committee recommended that the CAB encourage consolidations among the independent carriers, and soon thereafter North American Aircoach System, Inc., asked CAB to approve a merger of North American Airlines, Trans National Airlines, Trans American Airways, Republic Air Coach System, California Aircraft Company and Twentieth Century Aircraft Company, the surviving company to be North American Airlines, Inc.

Aircraft owned by these companies comprises Douglas DC-4's equipped with rearward facing "safety seats" and soon will include factory-new DC-6B's, the first to be produced in an all coach configuration. Ticket offices are located in 23 major cities.

Today, only seven years after the first air coach flight, revenue passenger miles approach Western Airlines', exceed Continental or Chicago and Southern, exceed the combined total of Colonial and Northeast, and the group ranks fifth among all domestic carriers in total air coach traffic.

Thus, this year, the golden anniversary of powered flight, NORTH AMERICAN AIRLINES, pioneering air coach in today's tempo, is proud to be following the trail of the pioneers who have contributed so much in the development and growth of the Nation's air transport industry under the American free enterprise system.

North American Airlines
First in Air Coach

high as $160,000 with standard conversions, while the DC-3 is selling for around $55,000 "as is" and for about $125,000 with standard conversions.

In all cases of multi-engine equipment, the conversions are priced higher than the original cost. This is understandable since the standard conversions offered by some of the major modification centers throughout the country are tantamount to building a new aircraft.

The L. B. S. Aircraft Corp., of Miami, Fla., for example, offers Executive Lockheed Lodestar and Executive DC-3 conversions that include complete overhaul, rebuilding of aircraft to accommodate more powerful engines, redesigning of cockpit, installation of complete radio and navigation equipment, and special sound-proofed interiors.

Remmert-Werner of St. Louis, Mo., offers a packaged deal for its Executive DC-3 conversion which includes installation of P&W 1830-Super-92 engines, toothpick props, custom interiors complete with fiberglas insulation, divans, swivel chairs, lavatory, closets, automatic cabin heat control, and other comforts. The cockpit is equipped with dual instrumentation, dual omni, dual ADF, dual speakers, and other communication and navigation equipment.

Cessna 170 Popular

In the single-engine aircraft field, the greatest demand in the used market is for the Cessna 170 and the more powerful Navion. The North American version of the Navion, which sold for about $6100 when new, is still commanding about $5000. The Super Navion in some cases is selling for as high as $15,000, very close to the original cost. The Beech Bonanza, which had a $7345 fly-away Wichita price tag in August of 1946, is going for about $6000 and, in some areas, for $7000.

Only about 40% of the survey respondents reported financing plans available for purchase of used aircraft, either converted or "as is." The financing is handled through special bank arrangements and is pretty standard. It entails from 25% to 33⅓% down, with up to 24 months to pay off the balance.

Lease arrangements are maintained by only about 10% of the dealer group and arrangements vary. All lease agreements reported contain option-to-buy clauses. One firm quoted its terms as one-third of price of the aircraft on deposit, with monthly rental fees stretched over a 12-month period based on one-third the cost of the plane.

Spare parts sales account for a nebulous percentage of total income of the broker group, as low as two per cent and under 10%. • • •

Faster—bigger payload—and converted for you

VERSATILE VICKERS VIKINGS

— MAINTAINED BY BRITISH EUROPEAN AIRWAYS AND READY FOR YOU TO TAKE OVER NOW

BEA photo

MAIN FEATURES

Engines: Twin Bristol Hercules 634 fitted with all modifications to latest Bristol Aeroplane Co. standard.

Propellers: Rotol R44/456/4. Hydraulic, 4 bladed. metal.

Electrical System: 24 volt D.C. Generators. Type 02-30 volt, 3,000 watt.

Radio: MF/HF WT T.1154/5., V.H.F. STR 12A 23 Channel, S.C.R. 269G A.D.F. Equipment, A.R.I. 5083. Gee/Mark 2, I.L.S., M.F.R. 24, B.C. 3611, B.C. 357 (Fan Marker), C.B.A.

All aircraft have British Certificate of Airworthiness.

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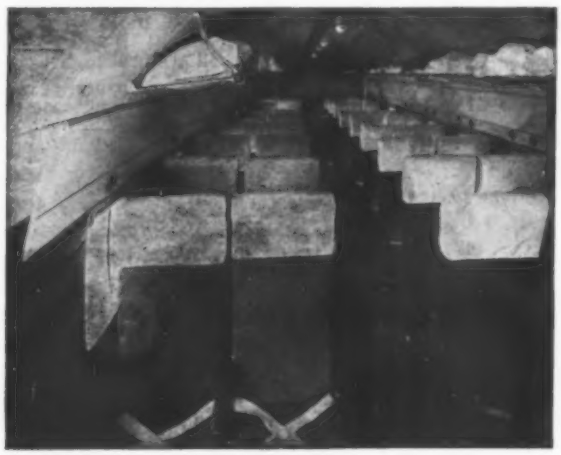
(b) **Viking "Mayfair"** — 36 passengers in luxury.
(c) **Viking Freighters** — Large door and freight floor fitted.
(d) **Viking "Executive"** — Luxury conversion similar to Queen's Flight.



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Where ordinary formed bellows fail, Breeze welded diaphragm bellows stand up under critical conditions for a long service life.

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Cities, AF Run Towers Shut Down by CAA

Only seven of the 18 CAA control towers selected for shut-down on June 30, unless other means were found to finance operation, are now functioning. Five of the seven are operating under short-term appropriations by the cities or the Air Force, pending results of the promised criteria review by CAA.

City funds to reimburse CAA for tower operation were provided for 90-day periods ending September 30 at Harbor Field, Baltimore; Westchester County Airport, White Plains, N. Y.; and Bridgeport Airport, Conn. The Air Force provided funds to keep the towers at Duluth, Minn., and Niagara Falls going for the month of August, pending final decision on who would finance further operations.

San Antonio, Tex., is the only city which took over tower operation completely, providing its own funds for its own personnel. The Air Force contracted to operate the tower at King Salmon, Alaska, for one year.

Flap Failure Seen Cause of R7V-1 Crash

Mechanical failure of one of the wing flaps caused the July 7 crash of a Navy R7V-1 Lockheed Super Constellation during a training flight near Chestertown, Md., a Navy investigation board has reported.

Left wing flap was fully retracted and right flap "97% extended" at the time of the accident, the board said, adding that in such a condition the plane became uncontrollable. Failure of the mechanism which extends the left wing flap resulted in this condition, it stated.

Pressurized A-26 for Corporation Flying

A pressurized-cabin, executive conversion of a Douglas A-26 has just been completed at Grand Central Aircraft Co., Glendale, Calif., on behalf of The Brown Paper Mill of Monroe, La., after 19 months of engineering and construction work.

AiResearch pressurization equipment, similar to that used in the Convairs, was adapted to provide a 7000-foot cabin altitude while at a plane altitude of 17,500 feet, with a 3.41 cabin differential.

The P&W R-2800B engines on the A-26 were replaced by R-2800C-83-AM 3's with Hamilton Standard reversible

propellers, providing greater speed, longer range, and small field performance. New specifications are: range, 3400 miles; cruising speed, 340 mph, with top speed of 400 mph at 17,500 feet. The plane accommodates six passengers and crew.

The aircraft, to be used by the mill as an executive transport between the U. S. and properties in Uruguay, has been equipped with full navigation and communication equipment, including a Bendix HF transceiver; two Bendix ADF receivers with iron core loops; a Collins VHF communications transmitter and receiver; a Collins Omni with glide-slope receiver; a Sperry A-12 autopilot with low approach coupler; and a Sperry Zero Reader with C-2 Gyrosyn compass.

Custom cabin interior features fully reclining seats, picture windows, and an observation dome. Grand Central retained P. C. Medina, on leave of absence from The Glenn L. Martin Co., as project engineer.

Revenue Hours of Use Per Day Per Aircraft

(Average for All Types)

INTERNATIONAL

	Jan.	Feb.	March	April
American	4:42	4:49	4:49	4:57
Braniff	8:32	8:04	7:36	7:04
C & S	9:03	9:30	9:28	9:45
Colonial	8:25	9:29	8:41	11:28*
Eastern	11:55	11:39	11:36	12:14
National	7:58	9:05	9:32	9:33
Northwest	7:43	7:52	8:23	8:10
Panagra	4:15	4:18	4:24	4:35
PAA				
Latin Amer.	5:26	5:09	5:12	5:07
Atlantic	5:03	4:56	5:39	5:49
Pacific	7:16	7:03	7:20	7:18
Alaska	6:48	6:35	6:51	7:30
TWA	6:13	6:22	6:32	6:50
United	5:19	5:31	5:47	6:16

LOCAL SERVICE

	Jan.	Feb.	March	April
Allegheny	4:58	5:08	5:21	5:37
Bonanza	7:23	7:02	5:53	5:50
Braniff **	6:08	6:38	7:09	7:16
Central	6:00	6:00	6:00	6:00
Frontier	7:14	7:18	7:09	7:16
Lake Central	4:04	4:35	3:30	5:39
Mohawk	4:10	4:43	5:01	5:11
N. Central ...	6:24	6:21	6:37	6:15
Ozark	5:42	7:00	6:00	6:00
Piedmont	6:52	7:12	6:39	7:29
Pioneer	6:10	6:19	5:36	4:48
Southern	6:36	6:31	5:56	6:02
Southwest ...	5:35	5:27	5:43	5:34
Trans-Texas .	5:34	5:37	5:23	5:20
West Coast ...	6:28	6:28	6:27	6:28
Wiggins	1:58	2:19	1:45	2:30

** Colonial's figure for April is based on eight hours daily availability per L-749.*
*** Covers operations of Braniff's local service route 106.*

PHOTO CREDITS

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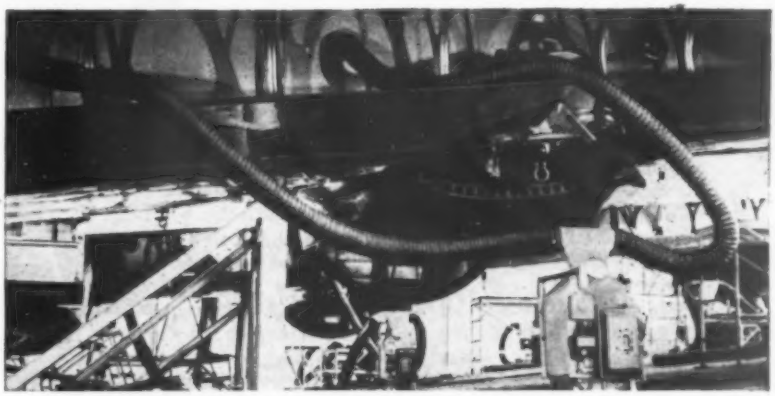

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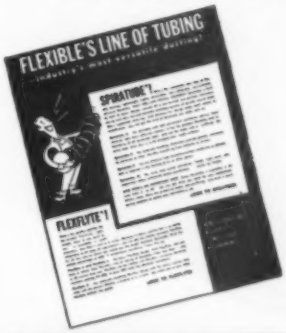

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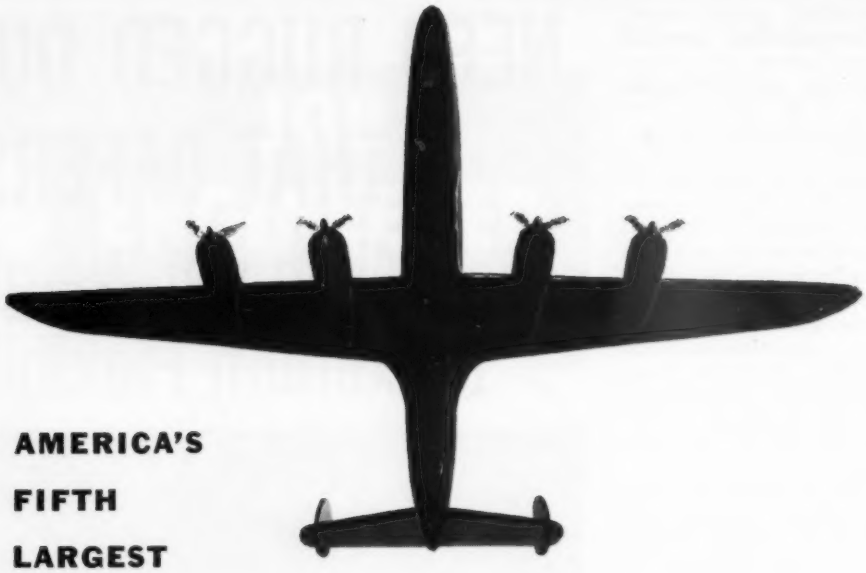

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Lockheed is proud to have Delta-C & S on the growing list of world airlines flying dependable, luxurious Constellations and Super Constellations. Today, a total of 25 airlines have selected these efficient high-speed airplanes... now flying to every continent and over every ocean in the world.

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Extra Section

By Robert M. Loebelson

ANY NEWSMAN covering the Washington scene inevitably runs across numerous tidbits which are not intrinsically newsworthy and consequently are not reported but which nevertheless make interesting anecdotes and give a good insight into the personalities of the individuals involved. The aviation trade press is no exception, as the following examples indicate.

• •

It was not very long ago that Defense Secretary Wilson, defending cuts in research and development funds, maintained before the Senate Military Appropriations Subcommittee that a good deal of research money had been wasted. When challenged by Sen. Edward J. Thye (R., Minn.), Wilson offered to convoy the Senator around and prove his statement. Wilson told Thye the examples of waste were scattered all over the country after the Minnesotan tentatively accepted, provided the examples could be proved at the Pentagon. Thye declined on the grounds that the Senate was still in session with plenty of work still before it. It was at this point that the Defense Secretary said, "Well, Senator, sometime this summer when you've got nothing else to do, I'll be glad to take you around and show you for yourself." Thye then rebuked Wilson, pointing out that lawmakers have "plenty of work to do" during the summer months.

• •

The scene was the Pentagon, and CIO-Autoworkers representatives were in town to register objections to the cancellation of Kaiser Motors Corp.'s C-119 and C-123B contracts. Present to represent the Air Force were Secretary **Harold E. Talbott,** Under Secretary **James H. Douglas,** and Assistant Secretary **Roger Lewis.** At one point Lewis was called upon to give his background and started out by saying he had been involved in plane production for many years, having begun in the shops of a major West Coast plane builder. **Emil Mazey,** UAW secretary-treasurer, interrupted him to state, "Then you were a union member. Do you still hold a union card?" Lewis admitted he did not and Mazey shot back, "You ought to be ashamed of yourself."

• •

Everything seemed to be all set for another government study on stabilization of the aircraft industry through a long-range procurement program. Harold R. Boyer, General Motors vice president in charge of the Cadillac tank plant in Cleveland and former chairman of the Aircraft Production Board, had talked the matter over with Defense Mobilizer Arthur S. Flemming and Harold S. Vance, Studebaker Corp. president and consultant to Flemming, and was ready to accept the job as chairman of the new committee. Then Boyer talked the matter over with his former boss at GM, Defense Secretary Wilson. Net result: No Boyer, no committee, study postponed indefinitely.

• •

Henry and Edgar Kaiser, at a specially called press conference, had just accused Fairchild Aircraft's management of "sabotaging" the nation's defense effort by trying to get plane production eliminated at Willow Run (this was before the cancellations). Later that day this reporter ran into Fairchild president **Richard S. Boutelle** and asked how he liked being called a saboteur. To which the Fairchild boss replied (in a quote toned down for a family publication), "Heck, I would have imagined they'd call me worse things than that."

• •

And then there was AFL-Machinists president Al J. Hayes' remark after the IAM lost a prolonged strike at General Electric's jet engine plant at Evendale when G.E.'s v.p. of industrial relations, L. R. Boulware, refused to go beyond the company's original offer. Said Hayes, "We have had other Boulwares to contend with before and have eventually worn them down. He's no exception."

Maintenance Bulletin Board

Skydrol Conversion Costs Revealed

One major advance in aircraft design for operating safety, the development of non-flammable hydraulic fluids, has been the center of much interest. Some airlines and military services have adopted the new fluids for fleetwide use. Others have been more hesitant, showing skepticism over the benefits to be gained compared to the costs involved.

Some interesting figures on these costs, furnished by KLM Royal Dutch Airlines, show the man-hour and material expenses for conversion of a Douglas DC-4 and DC-6 aircraft for use of Monsanto Skydrol fluid.

What it Cost KLM to Convert

	DC-4	DC-6
Material Costs		
Conversion of supercharger system	none	$498
Conversion of aircraft hydraulic system	$630	638
Man-hour Requirements		
Engineering hours	400	595
Modification—supercharger units	none	132
—hydraulic units	290	290
Man-hour Requirements		
Processing aircraft	200	395
Installation of units	200	257
Testing and inspection	180	196
Flight test	3	3
Total Man-hours	1323	1848

Note: The KLM conversion is based on methods spelled out in Douglas Service Bulletins No. 436 for DC-6 and No. 104 for DC-4, and figures for the DC-4 are estimates, as the modification has not yet been incorporated in DC-4's by KLM.

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ROTARY BROACH now in use at Capital.

Broach Does Better Reaming Job for CAP

Highly successful is Capital Airlines' experience with a new tool for reaming engine exhaust valve guides and guide bosses. The Capital method calls for use of a rotary broach in lieu of the conventional fluted reamer for the cylinder reaming operation. The results:

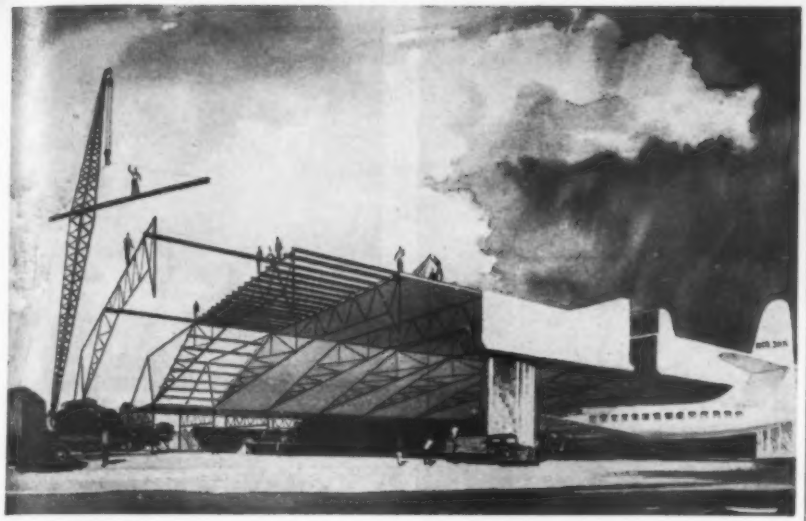
• **A better reaming job in less time:** broach produces a truer hole within closer tolerances and with a smoother finish.

• **Almost endless tool life:** the broaches can be resharpened as many as 25 times, and some have seen service for four years with no end in sight. The fluted reamers lost size with each resharpening, calling for frequent replacement.

• **Lower initial cost.** Rotary broach used by Capital costs about $55 per tool, while the fluted reamer cost is nearer to $100.

Capital's decision to use the rotary broach was the idea of cylinder shop lead mechanic H. W. Scott. His selection was a broach marketed by the Shearcut Tool Co., division of the Fearless Tool Co. of Reseda, Calif.

Key to Scott's success with the broach has been finding the right cutting coolants to use for the various jobs to be done, a problem now overcome after much experiment. For use in reaming cast iron guides in Wright engines, the



At Idlewild a new hangar and operations building will be built for United Air Lines by the New York Port Authority, with completion scheduled for the spring of 1955. Tall tails of future aircraft will be accommodated by means of the truss split at the top of the six hangar bays. Hangar will be able to house 10 of the largest planes.

broaches are chrome-plated; for the bronze-stainless-steel-tipped guides in Pratt & Whitney R-200 engines, an unplated broach is used.

MAINTENANCE BRIEFS

Use of Nokorode soldering paste for soldering aircraft electrical connections has been banned by one major airline. Operator warns its personnel that Nokorode is corrosive, and that only rosin flux or rosin core solder is to be used.

• •

Service tests of Shell **TCP fuel additive** in American Airlines' eight Douglas DC-6 coach airplanes which have now been under way since September, 1952, are being extended to include four additional airplanes recently converted for coach operations.

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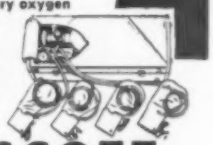

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FUEL LINE coupling is inspected by its developers.

Leakproof Coupling Developed for Jets

A leakproof fuel line coupling, developed by Lockheed Aircraft Corp. research engineers Doug Thompson and Jim Detweiler (see photo) and now being installed in current Lockheed-built jets, promises to make the airplanes easier to refuel and safer to fly.

Their design is a sleeve and O-ring type of flexible coupling which allows as much as four degrees of bend in flight and keeps a tight seal in temperatures as low as minus 65° F. and as high as 600° F.

Main problem with the old style couplings was their reaction to fuel, either expanding or contracting, leading to deterioration and eventually causing dangerous leaks. New design won't shrink, swell, or shiver free under pressure, and can be used in almost any gas or liquid system.

The Thompson-Detweiler coupling has other advantages: with its use, aperture requirements in the airplane are smaller, and coupling installation and maintenance, particularly tightening, is easier. It also allows use of a greater range of sizes, from one- to four-inch fuel line diameters.

Production of the coupling in both dural and stainless steel is being handled by the E. B. Wiggins Co., of Los Angeles, under a license arrangement with Lockheed. It is identified by the trade name Wig-O-Flex.

WAL Finishes Conversion To P&W CB16 Engines

Western Air Lines has completed conversion of its Pratt & Whitney R-2800-CA18 engines to the later model CB16 engine for its Convair 240 fleet.

The changeover cost approximately

$250,000, but WAL anticipates it will get its money back in short order from improved performance at altitude airports. In addition, the airline saves money on spares by standardizing on the CB16's, which also power its new Douglas DC-6B airplanes.

Until its acquisition of the DC-6B's earlier this year, WAL flew the Convair 240's mainly on its Pacific Coast route, where no penalties were imposed, due to the fact that the CA18 is a full-throttle engine at sea level.

The change in low blower characteristics which enables the CB16 to develop its full rated 2400 horsepower (wet) up to 4000 feet is now making it possible for WAL to begin replacing its DC-3's with the faster, more economical Convair's on certain key inland routes, where airport altitudes are relatively high.

At Denver's 5200 feet, the CB16 develops 2250 hp, as compared with 2060 hp for the CA18. The increase in maximum gross take-off weight for the Denver airport is from 36,300 pounds to 39,500 pounds. Similarly, the CB16 engines permit WAL's Convairs to take off from Salt Lake City at 40,700 pounds, as compared with 37,450 pounds for the same airplanes when they were powered by the CA18 engines.

The maximum certified gross weight for the Convair 240 with all improvements, including dump chutes, is 42,500 pounds. Flying relatively short ranges, Western has no need for the dump chutes and maximum allowable gross for its planes is 41,790 pounds.

TCA Orders AiResearch System for Viscounts

Trans-Canada Air Lines has ordered cabin pressure regulator systems from AiResearch Manufacturing Co. for its turboprop-powered Vickers Viscounts. This makes the Viscount the first foreign-designed airplane to use the AiResearch cabin pressure regulator system.

Each system includes a cabin pressure controller, two outflow valves, and a safety valve. The new controller combines a cabin pressure selector, a rate of change selector, and a differential pressure control in one box designed for mounting on the pilot's instrument panel.

Systems will be installed by Vickers on new planes to be delivered to TCA. Engineers for AiResearch, Vickers, and Trans-Canada tested the equipment at Churchill, Canada, earlier this year to assure that it would meet the airline's requirements and operate in temperatures as low as—40° F.

(*)When the problem is aviation connectors for motor starters, battery chargers, conveyor loaders, bomb hoists or other miscellaneous ground equipment and present connectors leave something to be desired . . . it's time to switch to the JOY line. Carefully manufactured to A N specifications, JOY plugs and receptacles are today's outstanding buy, for long range trouble-free service. Molded as one-piece (600 volt insulated) units, plugs can't crack or shatter and are practically impossible to knock out-of-shape. Sturdy laminated glass cloth melamine bases make the receptacles equally safe and long-lasting.

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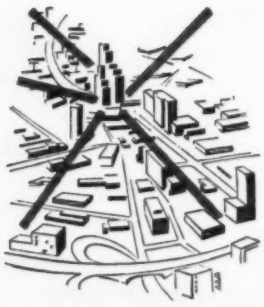

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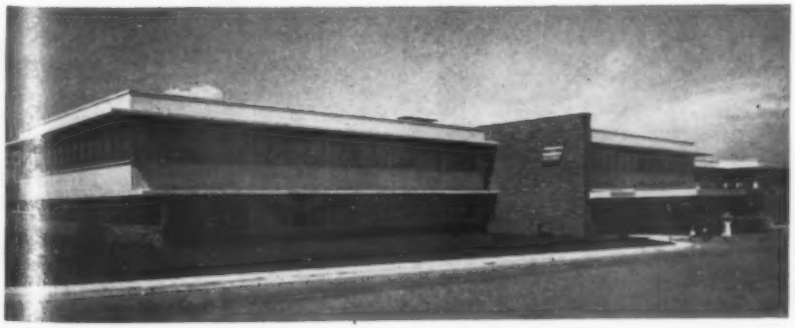
One of a series of selected portraits of some very select members of the airline family, as seen by Richard E. Chamberlain.

WANTED . . . Young men desiring clean, pleasant employment. Airline personnel enjoy highly paid, choice positions in their community. Apply now, while selection is good. Must be of better-than-average intelligence to qualify. Make your application in writing, stating your qualifications, for this high-type employment, to Box 000.



Operations control of United Air Lines' 13,250-mile system is now centered in this new building at Stapleton Airfield, Denver, Colo. Made of red sandstone and white-surfaced brick, the $1.3 million structure has 90,000 square feet of floor space.

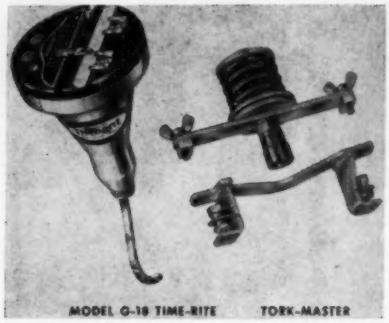
A 38 per cent increase in airplane tire life is but one of the many proved advantages of the Hytrol Anti-Skid Braking System. Hydro-Aire, Inc., 3000 Winona Avenue, Burbank, California.

is said to provide the self-sealing and self-

GREER TOPICS

Important News of Aviation & Industrial Test Equipment

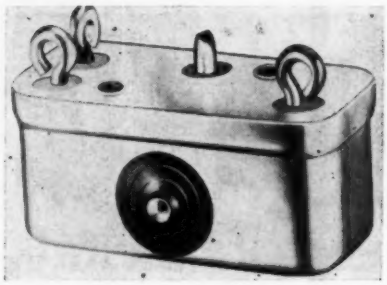
New Products



Piston Indicator: Piston position indicator, TimeRite model G-18, announced by The E. H. Horton & Son Co. has been designed especially to overcome problems of cylinder fin interference with timing operations on Pratt & Whitney R-4360 engines.

As a complement to the new TimeRite tool or the model B TimeRite used on other engines, the Horton company has also produced the Tork-Master torque inducer to simulate magneto operating conditions for timing purposes. Adaptable to any magneto, the Tork-Master applies a 40 pound-inch counter load to take up the backlash of the magneto gear train, eliminating possibility of critical error in timing.

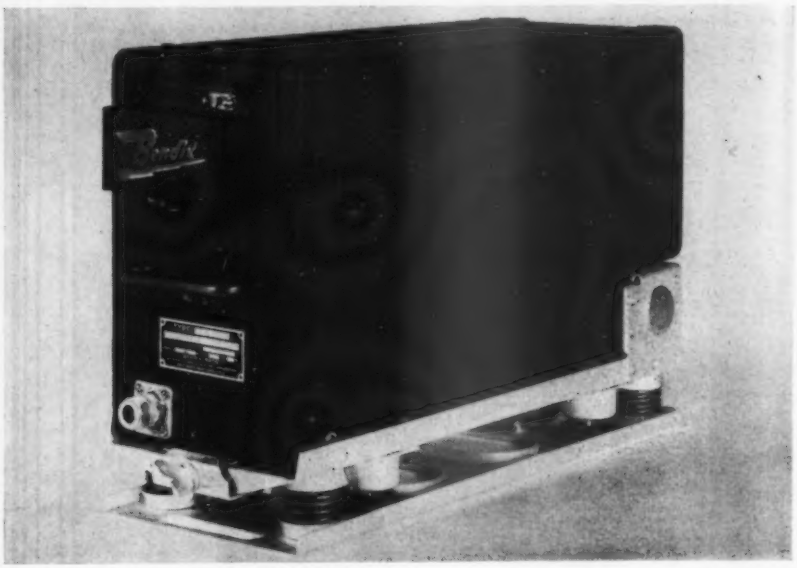
Address: **Gabb Special Products Division, The E. H. Horton & Son Co.,** Windsor Locks, Conn.



Snap Switches: Hermetically sealed precision snap switches announced by Haydon Switch Co. are said to have a minimum life of 100,000 operations at rated load, and to operate at about half the force required to actuate standard aircraft quality switches.

New Haydon switch design features a one-piece, heavy duty beryllium copper switch blade with pure solder contacts welded in position. Resistive ratings from 0 to 50,000 feet altitude include 28-volt d-c 210 amperes, and 110 volt 60 to 400 cycle a-c 210 amperes.

Address: **Haydon Switch Co.,** 232 No. Elm St., Waterbury, Conn.



EXTERNAL VIEW of new Bendix glide slope receiver. Below, an interior view.

Glide Slope Receiver. A new high sensitivity instrument landing system glide slope receiver, which weighs less than 13 pounds and provides 20 channels, in the frequency range of 329.3 to 335.0 megacycles, has been announced by Bendix Radio, Division of Bendix Aviation Corp.

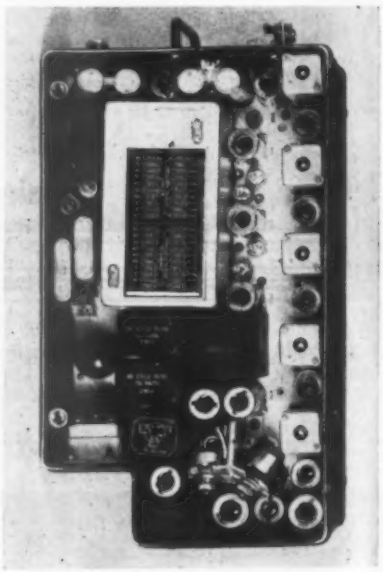
First order for the new receiver, designed by Bendix for modern high-speed aircraft, calls for its installation in Douglas DC-7 airplanes scheduled for delivery next year to United Air Lines. UAL is also said to have selected the receiver for future standardization in its Douglas DC-6 and Convair 340 fleets.

MN-100A glide slope receiver, as it is identified by Bendix, features:

- **High sensitivity:** 30 microvolts or less will produce at least 60 microamperes deflection current when receiver is adjusted to standard test conditions.
- **Selectivity:** Bandwidth corresponding to an off-resonance attenuation of 6 db is a minimum of 135 kc, and at 60 db is not more than 500 kc.

Receiver measures 4⅞" wide, 7 9/16" high, and 13 5/32" deep, conforming to ½ ATR mounting requirements. Removable side covers offer accessibility to all integral parts, and a shock-mounted base is provided with rear plug connector.

Power supply for the MN-100A calls for 27.5 volts d-c for filaments and frequency change circuits. Receiver has a self-contained plate supply which requires 115 volt 400 cycle a-c. Frequency selection is accomplished by means of a VOR-localizer-glide-slope control selector, which is also used in conjunction with the recently announced Bendix NA-5 distance measuring equipment.

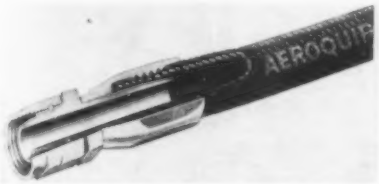


Address: **Bendix Radio, Division of Bendix Aviation Corp.,** Baltimore 4, Md.

Seals. Self-sealing and self-adjusting hydraulic packing of molded Kelon-T (du Pont Teflon) for use in valve stems, hydraulic cylinders, jacks, lifts, and pumps has been introduced by W. S. Shamban & Co. Featuring a "Vee" construction which

is said to provide the self-sealing and self-adjusting characteristics at only finger-tip gland pressures, the Shamban S-2500 Vee-Seals, as they are called, are completely inert to hydraulic fluids, oils, petroleum products, acids, or solvents. Useful temperature range for new packing is from minus 110°F. to plus 500°F.

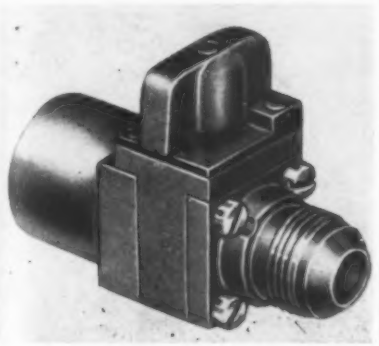
Address: W. S. Shamban & Co., 11617 W. Jefferson Blvd., Culver City, Calif.



Hose Lines: "Globe Seal" is the name given a new design of hose lines now being produced by Aeroquip Corp. for direct mating with Ermeto and Ferulok tubing connectors. Available in both single and double wire braid types, the new Aeroquip flexible hose uses the company's conventional detachable fitting but includes a new nipple for adaptation to Ermeto and Ferulok connectors without need for ferrules or inserts.

Design permits assembly of fitting to flexible hose with ordinary hand tools. After hose is cut square with a hack saw, it is only necessary to screw socket onto hose counterclockwise and screw nipple into the hose and socket.

Address: Aeroquip Corp., Jackson, Mich.



Drain Valves: A new series of ball drain valves for fuel, gas, water-alcohol, or corrosive liquid aircraft systems has been announced by Koehler Aircraft Products Co., Inc. Claimed to be the smallest and lightest available to the industry, new Koehler valves are available in three sizes in a large and small group classification.

Small valve sizes accommodate ¼", ⅜", and ½" OD tubing installations; large group sizes are for ⅝", ¾", and one-inch OD tubes. Valves are designed for system pressures up to 100 psi, and, when fitted with Teflon seals, can be rated up to 500 psi.

A variety of sizes and port types permits use of some designs as manual shut-off valves in fluid lines. For such locations,

GREER TOPICS **Important News of Aviation & Industrial Test Equipment**

A fuel flow distributor for the Westinghouse J-40 jet engine is checked for accurate and dependable performance by an expert inspector. Greer precision-engineered and built the test machine above to meet the precise test requirements of Westinghouse.

Westinghouse Jet Engines Under Rigid Quality Control

Greer Hydraulic Control Pump Test Stand meets the high quality control standards required at Westinghouse. Components are inspected under simulated flight conditions.

Westinghouse lube pump for J-40 jet engine gets thorough inspection with Greer built test stand. Accurate readings from meters and gauges decide components dependability.

Greer Test Equipment subjects jet components to rigorous inspection

A thorough quality control system is maintained at Westinghouse to make sure each J-34 and J-40 jet engine component will stand up in use. These complex parts are put through gruelling tests under simulated flight conditions to ferret out weaknesses and determine air worthiness. The test equipment *must* give a true picture of performance.

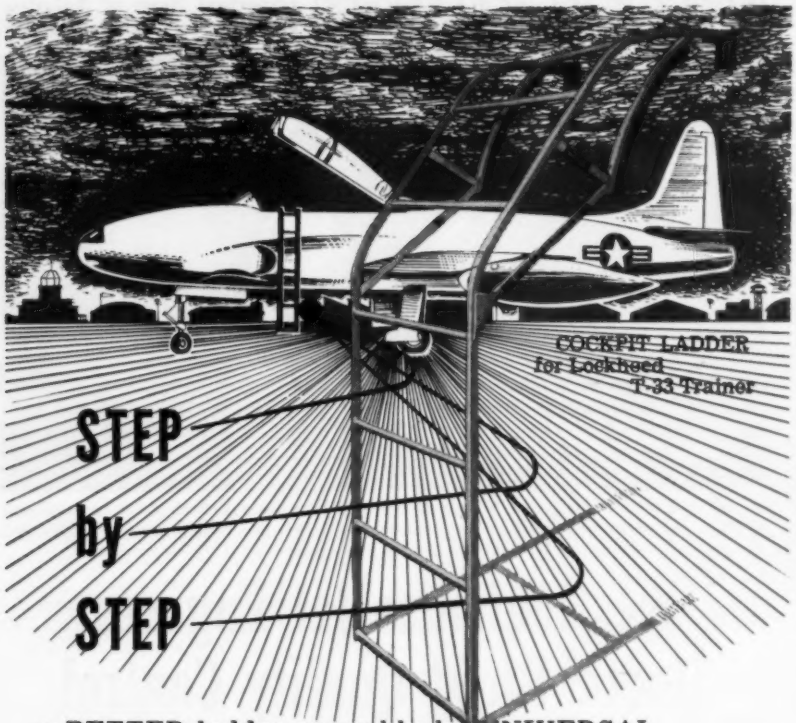
That is why Westinghouse chooses Greer. Because Greer test machines are precision-engineered to give the same accurate, dependable results regardless of place, conditions or operator. Greer equipment is in use the world over by leading aircraft manufacturers and airlines.

Greer designs and builds to meet your out-of-ordinary test requirements, and in addition, has a complete standard line of machines to check all systems of all aircraft—so standardized they can be ordered directly from our catalog.

GREER TEST EQUIPMENT

Greer Hydraulics Inc. 454 Eighteenth Street, Brooklyn 15, New York

Field Offices: 1908 West Cermak Road, Chicago, Illinois • 25 South Main Street, Dayton, Ohio 2832 East Grand Boulevard, Detroit, Michigan • and sales representatives in all principal cities



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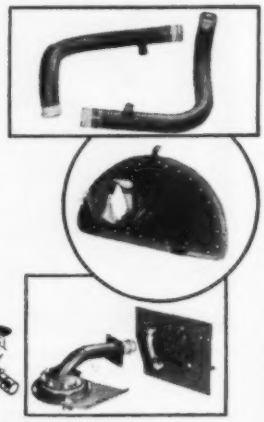
Write, phone, wire ... let us help develop and quote your complete assembly ... either on production or experimental runs! Join hundreds of satisfied UMPCO customers. Act today!



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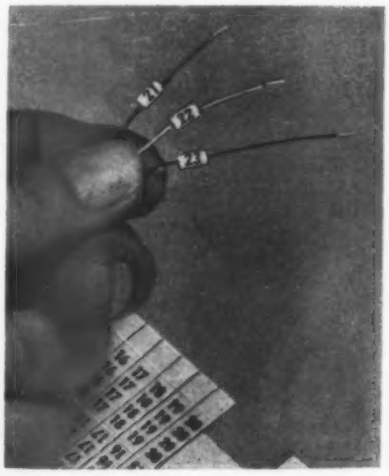
valve shafts for remote actuation may be obtained.

Address: **Koehler Aircraft Products Co., Inc.**, 814 Vermont Ave., Dayton 4, Ohio.

Dessicator: To eliminate fogging of fighter aircraft cockpit canopies, a chemical air dryer is now being produced in quantity by Aridair Products. The unit is simply a transparent plastic cartridge with two end caps threaded for tubing connectors. Dessicant used is Sovabead, which is retained in cartridge by a screen ring at each end. Literature available.

Address: **Aridair Products**, 260 South 20th St., Newark 3, N. J.



Wire Coding: Coding markers for small gage wiring in electrical and electronic installations are now being marketed by the Westline Products Division, Western Lithograph Co. Only ¾" long, new E-Z Code markers, as they are called, eliminate time-consuming trimming of larger markers, and pocket-size mounting (2" x 10") facilitates handling.

Over 1000 available codes printed on fabric-coated, pressure-sensitive tape use small size numerals for fast and easy identification.

Address: **Western Lithograph Co.**, 600 East Second St., Los Angeles 54, Calif.

Technical Literature

PUSH-BUTTONS: General Electric Co. of Schenectady 5, N. Y. has a new brochure for its line of oil-tight push buttons.

ELECTRICAL FITTINGS: Complete line of solderless wire connectors and specialized electrical fittings is described in 16-page Catalog 53 by Buchanan Electrical Products Corp., Hillside, N. J.

GLASS TEXTILES: A 32-page pamphlet, titled "Glass Textiles for Industry," published by Hess, Goldsmith & Co., Inc., 1400 Broadway, New York 18, N. Y., lists 60 different constructions of broad glass fabric.

ADHESIVES AND COATINGS: The Adhesives & Coatings Div. of Minnesota Mining & Mfg. Co., Detroit 2, Mich., lists major 3M industrial adhesives, coatings, and sealers and describes applications.

FEDERAL SUPPLY CODE: "The Federal Supply Code for Manufacturers," published in 1951, now has a supplement which contains 7200 listings of manufacturers assigned code numbers. Superintendent of Documents, Washington 25, D. C., at $1.25.

GRAPHIC PLOTTING: IBM automatic graph plotting for line, point, and bar graphs is described in a new booklet compiled by the Dept. of Information, International Business Machines Corp., 590 Madison Ave., New York 22, N. Y.

POWER TOOLS: A new 40-page catalog, No. 39-A, presents details of the portable electric power tools manufactured by Thor Power Tool Co., Aurora, Ill.

WORM GEARS: Illustrated 36-page catalog, produced by Cone-Drive Gears Div., Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich., documents 93 applications of double-enveloping worm gearing.

MAGNETIC TAPE RECORDER: Details of NADAR (North American Data Airborne Recorder) are presented in a four-page folder prepared by Missile and Control Equipment Dept. of North American Aviation, Inc., 12214 Lakewood Blvd., Downey, Calif.

METAL CUTTING FLUID: A new four-page illustrated bulletin describing applications and methods for use of the new Dynatomics water-and-oil soluble metal cutting fluid, Metalloid W&S, is available from the Metalloid Corp., Huntington, Ind.

RIVETS: Fluid-tight jacketed and washered self-sealing rivets used in aircraft and industrial applications are outlined in a four-page folder issued by Pastushin Industries, Inc., 501 No. Prairie Ave., Hawthorne, Calif.

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Supreme Court Gets 'Offset' Pay Argument

The question of whether profits of domestic airlines will be used by the government to offset losses in international operations has been submitted to the U. S. Supreme Court. As things presently stand, a May 4, 1953, decision of the U. S. Court of Appeals would have CAB reverse its policy and apply domestic profits to international losses.

But early this month the airline immediately involved—Delta/C&S—and the CAB petitioned the Supreme Court to review and reverse the Appeals Court ruling, which was a 2-1 vote. Among other things, they contend the lower court's ruling could lead to a "chosen instrument" policy in international services.

Said Delta-C&S: "If CAB is forced to follow the decision (of the Appeals Court), the result sooner or later will be to drive domestic carriers out of any substantial international operations in which several of them have been certificated during the last 10 years under a carefully developed national policy."

CAB expressed similar views and, in addition, saw the offset theory as destroying the incentive of domestic lines, stating, "Indeed, the easy road for the carrier is to become permanently subsidized as to its whole system."

CAB also joined Western Air Lines in seeking review by the high court of another Appeals Court decision, also dated May 4, which, by a 3-0 vote, ruled that any and all profits from the sale of WAL's Route 68 to United Air Lines should be considered as "other revenue" and, therefore, offset against mail pay need.

Changes Coming in IATA Conferences

Changes in the day-to-day administration of the International Air Transport Association's Traffic Conferences (in which international airline rates and fares are worked out) will result from the creation of a new IATA traffic Advisory Committee to replace the earlier Traffic Committee.

IATA has established the new post of Traffic Director (filled by J. W. S. Brancker, formerly BOAC's General Manager, International Affairs) to be responsible for the supervision of IATA traffic activities, the direction of the Conferences, preparation of their agenda, and for continuous supervision designed to enable the Conferences to reach decisions in the shortest possible time (thus ensuring that there will never be another meeting like last year's Cannes session, which lasted five weeks).

Airline Commentary

By Eric Bramley

UNDER a Presidential reorganization plan, the Post Office will no longer pay airline subsidies. These will come out of the Civil Aeronautics Board's budget, with the PO paying "service" rates for the carriage of mail. Airlines would do well to point out that under the new system the PO will show a profit of ¾¢ on each six-cent air mail letter, and 25¢ on each air parcel post package.

• •

Regarding our complaint in the July 20 issue that some airlines are still taking too much time to issue tickets, a well-traveled reader comments: "It happened that I read your column yesterday after standing in line for 21 minutes to buy a ticket from Chicago to Indianapolis and return. I was the ninth man in line and it does seem to me that the airlines could do their bookkeeping on their own time rather than on their customers'. Whenever they get to taking up more time issuing tickets than it would take to get there by train, they are going to lose some business."

• •

A promotional campaign that should benefit the airlines is about to be started by General Mills, makers of Wheaties. The company will insert in its cereal packages full-colored emblems (on gummed paper) of 15 airlines. Campaign will be supported by radio and television advertising. Should acquaint a lot of youngsters with the carriers. After reading in this column of a plan (Travelfares, which may get going soon) for attaching coupons to merchandise and making them good for air trips, General Mills informs us that it's definitely interested in the couponing of air travel. In other words, so many coupons from Wheaties boxes would get you a trip. With the millions of boxes sold each year, it could mean good revenue for airlines.

• •

At any major air terminal, thousands of children take school-conducted tours of the field each year. Lockheed Air Terminal is taking advantage of this opportunity to educate the younger generation by distributing an excellent booklet to the visitors. Prepared with the help of educators, it gives a clear explanation of the airport and how the airlines operate. It faces up to the problem of "close-in" airports, explains measures taken to protect people on the ground, how the carriers try to reduce the "noise nuisance," etc. The booklet is prepared so that it can be adapted to any airport. Quantities are available (at cost) for schools or airports by contacting Gordon Stanton, Lockheed Air Terminal's public relations director, Burbank, Calif.

• •

Northeast Airlines, which believes in promoting its air taxi operators, is showing in the current issue of *Official Airline Guide* all the air and ground taxi services available from its on-line points to resort areas. Mileage and rates are listed. Interesting to note that in some cases where both types of service are offered, air taxi is cheaper as well as faster.

• •

ODDS AND ENDS: Quite a hassle at Lambert-St. Louis Municipal Airport, with newspaper reports of **"hoodlum drivers of some unmetered cabs"** moving in on the established ground operator. There have been fights between drivers, threats, etc. One passenger had his bag torn apart as rival drivers fought over it. . . . Delta-C&S had an irate passenger at Asheville who arrived late at the airport and couldn't understand why the agents wouldn't call **the departing plane back to the gate.** They took him into operations, explained weight and balance, reservations, etc. He was so interested that the "tour" lasted over an hour. Result: a satisfied customer. . . . TWA is displaying an excellent series of posters at its stations on **right ways and wrong ways to handle baggage.** . . .Lines at Chicago, working to improve handling of interline baggage, experimented recently with use of radio-equipped pickup trucks, operating on regular schedule between carriers' baggage areas. Results are being studied. . . .

MACKEY AIRLINES' officials salute their 10,000th passenger at Fort Lauderdale, Fla. From left to right: Len Povey, executive vice president; Joseph C. Mackey, president; Robert Tischler, operations director; Mr. and Mrs. Milton N. Weir, Jr., and Roger Folwell, chief pilot.

Mackey Airlines: Profit Without Mail

Half year of operations between Florida and Nassau puts tiny international carrier in the black.

By William V. Henzey

WHEN Joseph C. Mackey, president of Mackey Airlines, made his first report to stockholders this summer, it was a report of significant accomplishments for the initial period of operations of the country's newest and smallest international passenger airline.

Among the accomplishments:

• **Completion** of the first quarter of certificated operations with a profit, despite the absence of Federal mail pay.

• **Completion** of all scheduled flights for the first five months, with only one delayed departure over that period.

• **An average** load factor of 54%.

Even more recently, two new milestones were reached when a July 16th flight carried Mackey's 10,000th passenger and completed the company's first 2,000,000 passenger-miles.

In the archives of staggering airline statistics, the Mackey record deserves a niche because every other U.S. international line operating similar type passenger services is receiving Federal mail pay help. So is every local service airline in the U.S., each of which exceeds Mackey in size.

Mackey is based at Fort Lauderdale, Fla. It holds a three-year certificate to operate between Fort Lauderdale and Palm Beach, on the one hand, and Nassau, on the other. It was licensed by CAB and the White House on June 6, 1952, and got its scheduled operations under way in January of this year.

Initially one 21-passenger DC-3 was used for two daily round-trips. Today the company is using three DC-3's and is converting the equipment to 28-seats.

New route and financing plans are also under way. Mackey has applied to CAB for an amendment of its certificate to permit operations between Nassau and Havana and between Havana and its Florida terminals.

Despite the success thus far with Nassau, Mackey said surveys with travel agents reveal a greater potential to Havana and a distinct need for the Florida - Nassau - Havana - Florida circle tour, which would be made available the new route is granted.

A new company-financing plan is a far cry from that day in 1946 when Mackey Air Transport, as it was then known, was incorporated in Florida. According to president Joe Mackey, "The entire corporation consisted of 50 shares of common stock, divided 25 shares in my name, 1 share in the name of Vera R. Couch, and 24 shares in the name of Frances M. Mackey. The total assets of the corporation itself consisted of one 'dream'."

The new plan calls for increasing capitalization of the line to 1,500,000 shares of one dollar par value common stock from the present 100,000 shares. Some 300,000 shares of the new stock will be issued to present shareholders on a three-for-one basis.

Another 100,000 shares will be set aside for employes' payroll deduction purchase. Thirty thousand shares will be on option to underwriters at one dollar net to the company, and 250,000 will be on option to Joe Mackey on the same terms.

Another 300,000 shares will be offered for sale, leaving an unissued balance of 520,000 shares.

For all of these seemingly elaborate plans, Mackey is growing "up" and not "out." Economy is prevalent in every decision. As one official said: "We have all felt and continue to feel that we would rather have a spare cylinder than an unneeded office desk."

Mackey's organization is small in number of employes but large in experience. President Joe Mackey is famed for helping to establish the route for ferrying "Bombers to Britain" prior to U.S. entry into World War II. During our participation, he organized the "Fireball Route" between Miami and India.

Mackey has as its executive vice president Leonard J. Povey, a well-known, 30-year aviation veteran; as its operations director it has Capt. Robert C. Tischler, who, among other things, flew 162 combat missions over the "Hump" in World War II; as its chief pilot, Capt. Roger G. Folwell, who soloed in 1931 and later flew with United, Continental, and American Overseas; and, as its secretary-treasurer and director of maintenance, John H. Popham, who has a wide military and civil background dating back to 1926.

Also mainstays in the company are James I. McCallum, chief inspector of aircraft; Joseph E. Phillips, chief auditor; Edward J. McGuire, in charge of bookkeeping; and Henry H. Johnson, assistant to Povey and in direct charge of traffic and sales.

Mackey has not restricted itself to its Florida-Nassau area. The company has 54 travel agents in the eastern U.S. representing it and has concluded interline traffic agreements with Eastern, National, Delta, Allegheny, Pan American, and Bahama Airways.

It has stimulated tourist travel to Nassau with a $30 thirty-day round-trip excursion fare. Standard fares are $20 one-way and $36 round-trip.

Mackey made a profit in a virtually untried market where precedent was lacking for scheduling or marketing its product. With the benefit of its own successful initial operation to base future plans on, the company should have a strong talking point when it comes time to renew or expand its current certificate.

• • •

...I'm old enough to be your great-grandmother!

The moral of this tale comes first! Don't sell youth short just because you're older in experience. You may be pleasantly surprised.

The Flying Tigers are less than ten years old, but we're already carrying quite a little weight in airfreight (over 41 million ton miles in '52). And we've got some spread around with other carriers (about 400,000 lbs. last month).

So, if you're in line for more business, give our rep. a ring. He'll be glad to talk over reciprocal freight arrangements with you.

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Write for free illustrated folder describing Flying Tigers' unique Advance Manifest System.
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People

AIRLINES

Sanford B. Kauffman and **Wilbur Waldo Lynch** were recently elected assistant vice presidents of Pan American World Airways. Kauffman's post is in engineering, and Lynch's, subject to Civil Aeronautics Board approval, in communications.

A. V. Leslie, former vice president-treasurer of Trans World Airlines, will return to TWA from the Hughes Tool Co., September 15, as vice president-finance and treasurer. Leslie will make New York his headquarters.

Farmer

Leslie

MANUFACTURING

Edwin L. Farmer, estimating administrator at Consolidated Vultee Aircraft Corp.'s Fort Worth Division, has been named to succeed **J. C. Felix** as division controller. **A. S. Cooper** will take over the estimating administrator post. Other Convair promotions: **Earl G. Hill**, named assistant to division controller, and **D. L. Watters** succeeding Hill as budget manager.

Donald W. Douglas, Jr., **Nat Paschall**, and **Stanley G. Walsh** have been elected to the board of directors of Douglas Aircraft Co. At the time of their election, it was announced that **William E. Douglas**, father of the company's founder, had resigned the position on the board that he has held since 1928.

The Parker Aircraft Co. has recently promoted the following executive personnel: **F. E. Amon**, formerly aircraft sales manager, to vice president in charge of sales; **R. J. Trivison**, formerly manager of the Valve Division, to vice president in charge of manufacturing; **Warner B. McCarthy**, formerly assistant treasurer, to secretary-treasurer.

Robert H. Burns, formerly president of Marshall Engineering Co., has joined Inet, Inc., Los Angeles, as general manager.

T. G. Preston has been named to head the newly organized Stratoflex of Canada, Inc. With Preston, at West Toronto, will be **W. S. Mathews**, chief inspector and **K. J. Tsujimura**, chief engineer.

Roscoe A. Ammon has succeeded **William F. McElroy** as president of the Marion Electrical Instrument Co., Manchester, N. H. McElroy will continue in advisory capacity and as a director of the corporation.

V. O. Ray has been appointed manager of the aircraft field engineering and service department recently estab-

lished by Westinghouse Electric Corp. at the concern's Small Motor Division, Lima, Ohio.

George S. Garrard, formerly of the Civil Aeronautics Administration's Powerplant Engineering Division in Washington, has joined the staff of Aircraft Industries Association as secretary of the Engine, Propeller, and Rocket Technical Committees.

James W. Wilder and **William Terry** have been appointed chief of quality control and assistant administrative engineer, respectively, of Flight Refueling, Inc.

Arthur R. Tallardy has been appointed assistant controller of Doman Helicopters, Inc.

Robert C. Cheek has been promoted from assistant division sales manager to the newly created post of assistant manager of engineering for Westinghouse Electric Corp.'s Electronic Division.

Harold W. Ball is the new plant manager of Texas Metal and Manufacturing Co.

William M. Steffen has been appointed general supervisor of materials and process engineering for Northrop Aircraft, Inc., reporting to **Frank Bolte,** Northrop's chief of engineering laboratories.

George B. Meyer has been named manager of the electronics section for aviation products at Westinghouse Electric Corp.'s Dayton office.

Shelby A. McMillion has been named director of advertising and public relations of Jack & Heintz, Inc., filing the post created by the recent death of **Sydney D. Mahan.**

The following employes have recently completed 20 years or more of service in the aviation industry:

- **E. W. Purdy,** American Airlines. Captain, New York. 25 years.
- **L. Stephan,** American Airlines. Captain, San Francisco. 25 years.
- **Romulus H. Weant,** Eastern Air Lines. Flight superintendent, Atlanta. 25 years.
- **Elmer G. Cross,** Eastern Air Lines. Buyer, Miami. 25 years.
- **W. E. Pereira,** American Airlines. Flight dispatch supervisor. Los Angeles. 20 years.
- **H. W. Barnard,** American Airlines. Overhaul and Supply office manager, Tulsa. 20 years.
- **L. W. Bryant,** American Airlines. Captain, Los Angeles. 20 years.
- **E. V. Rickenbacker,** Eastern Air Lines. President, New York. 20 years.
- **Marguerite Sheppard,** Eastern Air Lines. Secretary to the president, New York. 20 years.
- **Jesse H. Brown,** Eastern Air Lines. Captain, Miami. 20 years.
- **Eugene Meyring,** Pan American World Airways. Captain, San Francisco. 20 years.

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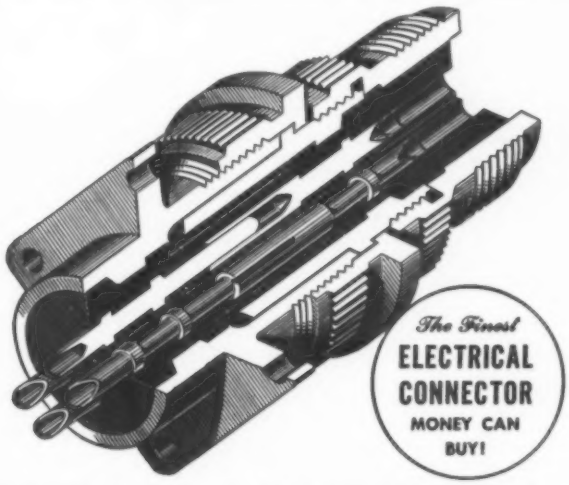

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U. S. International Airline Traffic, May, 1953

Airlines	Revenue Passengers	Revenue Passenger Miles	Available Seat Miles	Passenger Load Factor %	U. S. Mail Ton-Miles **	Foreign Mail Ton-Miles	Express Ton-Miles	Freight Ton-Miles	Total Ton-Miles Rev. Traffic	Available Ton-Miles Flown	% Available Ton-Miles Used	Revenue Plane-Miles	Scheduled Miles	% Scheduled Miles Completed
American	9,137	6,710,000	9,795,000	68.50	16,322	4,114	432	205,103	930,634	1,418,784	65.59	192,530	191,559	100.00
Braniff	2,606	6,079,000	16,367,000	37.14	58,823	7,780	....	88,782	830,897	2,258,754	36.79	369,909	370,127	99.94
Colonial	5,832	4,515,000	5,708,000	79.10	1,513	492	....	5,756	485,743	827,538	58.70	109,281	50,076	95.12
Delta-C&S *	2,813	3,871,000	7,529,000	51.42	5,748	758	....	88,801	499,178	1,043,881	47.82	161,471	161,472	99.99
Eastern	13,036	19,387,000	30,754,000	63.04	59,193	....	....	70,783	2,132,418	3,928,648	54.28	482,912	357,965	99.55
National	6,668	3,540,000	9,273,000	38.18	5,283	....	2,440	31,989	404,175	1,155,168	34.99	147,390	146,920	100.00
Northwest	7,437	11,835,000	23,029,000	51.39	120,705	24,980	17,153	795,056	2,231,738	3,629,244	61.49	583,788	597,048	95.84
Panagra	9,702	10,372,000	20,419,000	50.80	30,726	27,482	....	233,014	1,443,301	2,795,573	51.63	513,113	495,326	99.44
PAA														
Latin Amer.	61,841	64,274,000	97,706,000	65.78	272,622	67,574	....	1,980,461	8,427,452	13,084,258	64.41	2,148,857	1,905,375	97.42
Atlantic	62,341	62,383,000	103,296,000	60.39	512,017	138,475	....	916,222	8,246,179	13,335,836	61.83	1,709,362	1,650,084	98.75
Pacific	10,410	35,467,000	57,922,000	61.23	442,650	102,645	....	633,080	5,013,522	9,140,316	54.85	1,071,427	1,081,653	98.42
Alaska	5,953	6,167,000	14,159,000	43.56	37,116	....	....	475,306	1,152,104	2,237,928	51.48	325,585	312,543	100.00
TWA	19,846	50,090,000	70,556,000	70.99	417,561	133,486	....	649,531	6,484,176	9,087,121	71.36	1,480,454	1,487,177	99.25
United	4,973	12,344,000	19,370,000	63.73	64,143	....	....	44,243	1,393,375	2,443,750	57.02	354,576	354,594	95.03
TOTALS	222,595	297,034,000	485,883,000	61.13	2,044,422	507,786	20,025	6,213,177	39,674,892	66,386,799	59.76	9,644,655	9,161,919	98.39

* Merger between Delta Air Lines and Chicago and Southern Air Lines was effective May 1, 1953.
** Includes air parcel post.

NOTE: 1. Above figures include both scheduled and non-scheduled operations.
2. Data in above tabulations were compiled by American Aviation Publications from reports filed by the airlines with the Civil Aeronautics Board. Figures for American Airlines include that carrier's service to Mexico but not to Canada; for Braniff to South America; Delta-C&S to South America; Colonial to Bermuda; Eastern to Puerto Rico; National to Havana; Northwest to Orient and Honolulu, and United to Honolulu. Operations of U.S. carriers into Canada are included in domestic reports to CAB, in accordance with CAB filing procedures.

Alaskan Airline Balance Sheet Data, Dec. 31, 1952

Airlines	Total Assets	Current Assets	Investments & Special Funds	Operating Prop. & Equipment	Deferred Charges	Current Liabilities	Long-Term Debt	Deferred Credits	Operating Reserves	Capital Stock	Surplus
Alaska	$ 2,172,562	$ 1,267,835	$ 48,237	$ 750,547	$ 102,794	$ 1,603,527	$ 379,906	$ 3,936	$ 92,000	$ 606,987	$ -513,794
Alas. Coastal	571,463	271,152	566	284,718	15,027	109,126	192,000	310	43,925	155,362	70,740
Byers	56,299	8,900	....	24,146	8,729	19,962	....	5,937	....	30,423	-23
Cordova	380,536	138,669	....	195,755	931	280,396	35,421	....	2,697	15,850	46,171
Ellis	572,683	296,895	1,200	250,713	....	182,413	36,339	....	....	66,463	287,468
N. Consolidated	1,355,955	504,903	525	822,348	27,828	701,433	578,718	15,848	133,860	382,235	-456,139
Pac. Northern	2,313,809	1,053,696	9,078	1,040,267	70,292	1,174,856	422,489	....	....	666,444	50,020
Reeve	301,726	181,524	....	119,122	1,081	167,267	....	....	37,531	170,356	-73,428
Wien Alaska	953,650	427,555	1,695	513,781	3,020	649,808	....	360	77,530	319,600	-93,648
TOTALS	8,678,683	4,151,129	61,301	4,001,397	229,702	4,883,788	1,644,873	26,391	387,543	2,413,720	-682,633

Alaskan Airline Revenues and Expenses, Calendar 1952

Airlines	Total Operating Revenues	Passenger Revenues	Mail Revenues	Express Revenues	Freight Revenues	Excess Baggage Revenues	Non-Scheduled Transport Rev.	Total Operating Expenses	Aircraft Operating Expenses	Ground & Indirect Expenses	Net Operating Income Before Income Taxes
Alaska *	$ 4,075,186	$ 1,153,244	$ 2,069,690	$ 11,553	$ 520,778	$ 21,482	$ 279,087	$ 4,951,760	$ 2,606,645	$ 2,345,115	$ -876,574
Alaska Coastal	1,056,508	455,971	454,490	34,014	27,989	9,719	69,846	966,310	435,679	530,631	90,198
Byers	76,939	18,073	45,013	....	7,879	937	4,881	74,799	33,956	40,843	2,140
Cordova	470,141	80,876	344,757	....	14,901	2,392	21,258	437,410	201,347	236,063	32,731
Ellis	744,500	337,511	301,806	49,975	....	5,072	49,712	638,669	280,854	357,815	105,830
N. Consolidated	2,218,725	534,578	1,240,353	4,868	165,800	17,722	186,299	2,272,072	1,058,572	1,213,501	-53,348
Pac. Northern**	5,023,730	2,712,862	1,740,436	....	495,186	44,690	15,517	4,415,697	2,063,680	2,352,017	608,033
Reeve	528,589	216,912	233,288	....	21,601	1,069	36,507	624,049	329,042	295,007	-95,460
Wien Alaska	1,766,922	347,518	1,093,721	4,558	114,787	11,348	152,654	1,947,588	1,109,381	838,206	-180,665
TOTALS	15,961,240	5,857,545	7,523,554	104,968	1,368,921	114,431	815,761	16,328,354	8,119,156	8,209,198	-367,115

* Figures include U.S.-Alaska and intra-Alaska operations.
** Figures include both Alaskan and overseas operations.

New Route for Central Awarded

A combination of one Republican and two Democratic CAB Members, plus a belated but effective legal conclusion, added up early this month to a new route segment for Central Airlines between Oklahoma City and Dallas/Ft. Worth and denial of Continental Air Lines' bid for entry into Dallas.

The combination of Board members, unique since the new Administration took over in Washington, found Republican Chan Gurney and Democrats Josh Lee and Joseph P. Adams outvoting Chairman Oswald Ryan and Vice Chairman Harmar D. Denny (both Republicans).

The majority chose Central for the new route segment after studying a report by its general counsel that other applicants for the route, including Continental, had conditioned their route proposals on non-renewal of Central's certificate. Thus, since CAB had earlier this year renewed Central's certificate, the majority reasoned that the other applications were moot.

Significantly, the Board had previously voted five to nothing to award the route to Continental—until the belated legal conclusion came to light. Then the vote switched to three to two for Central on the theory that it was the only legal applicant.

Central's route, effective from September 29, 1953, to February 19, 1956, is via Chickasha, Lawton-Fort Sill, and Duncan, Okla. Because of substantial oil interests in intermediate cities, CAB expects it to increase Central's overall load factors by about 10 percentage points.

Meanwhile, Continental not only lost the Oklahoma City-Dallas route bid but also was turned down on its proposed extension from Wichita Falls to Dallas. Braniff, which feared diversion if Continental was successful, was authorized to operate non-stop between Tulsa and Dallas and to serve Lubbock and Wichita Falls on the same flights.

The Board agreed, however, to permit Continental to continue serving Lawton-Fort Sill, Okla., until February 19, 1956.

Gordon Bain Leaves Air Operations

Gordon M. Bain, director of CAB's air operations bureau and generally considered the Board's most influential staff member, has submitted his resignation, effective in mid-August. Bain's departure, expected to touch off other personnel changes within the operations bureau, is the third major move of its kind since the Republican Administration took over in January.

Previously, Raymond Sawyer, with strong Republican backing, was named executive director of CAB following the resignation of James M. Verner. Then another Republican-backed candidate, Robert L. Griffith, was named to fill the vacancy created by the resignation of Oliver Carter as enforcement chief.

Bain, whose successor had not been announced at press-time, headed the Board's largest bureau since early 1951. Though a conscientious and resourceful staff head, his CAB career was controversial, particularly because of his alleged influence on the Board members, which one airline president referred to as "the tail wagging the dog."

CAB MISCELLANY

• **Over 100 of the nation's common carrier railroads** have asked to intervene in opposition to non-scheduled airline groups in CAB's "ACTA and IMATA Agreements Case" in which the associations seek to change their scope of operation.

• **Lake Cetntral Airline has asked immediate mail pay help** to offset a five cent per plane-mile deficit being incurred under present rates.

• **A Capital Airlines complaint against Northwest Airlines'** practice of selling alcoholic beverages aboard domestic flights allegedly "in violation of laws of seven out of ten states" has been tentatively dismissed by CAB's enforcement office.

• **Central Airlines has applied for a new route segment** between Kansas City and Paris, Texas, via Joplin, Fayetteville, and Fort Smith.

• **E. W. Wiggins Airways,** whose local service certificate expired August 1, 1953, following a non-renewal decision by CAB, has applied for authorization to conduct air taxi operations under its established name.

CAB News

AS OF NOW . . .

Procedural steps in the **Colonial Merger Case** have been completed and the record is now before CAB for decision. Because Colonial's Canadian and Bermuda routes are involved, the case also will go to the White House for Presidential approval.

Hearings in the **North American Airlines Enforcement Case,** recessed since June 23, face continued indefinite postponement until legal issues raised in the Washington courts are decided. If and when resumed, the hearings again will be held in Los Angeles.

North American has figured in postponement of hearings also in the **New York-Chicago Service Case** which recently was expanded by CAB to include the non-scheduled airline combine as a route applicant. North American needed more time to prepare exhibits, so hearings were set back from October 19 to November 2.

The **Ozark Air Lines Renewal Case** (hearings scheduled for September 28), continues to shape up as a major proceeding embracing most of the problems inherent in the growing trunk-versus local-service controversy.

RECENT CAB DECISIONS

• **Northwest Airlines** granted authorization to use name of "Northwest Orient Airlines," subject to conditions designed to assure that the public will be aware of the company's regularly certificated name.

• **Western Air Lines** dropped from investigation with contemplated possible merger of Alaska and Pacific Northern with WAL. Revised case involves study of merging States-Alaska routes of Alaska and PNA.

• **Ozark Air Lines** made subject of investigation instituted to determine if the local line's routes should be extended from Moline to Chicago via Clinton and Rockford.

CAB CALENDAR

Aug. 25—Hearing in Lake Central, TWA Ft. Wayne Extension Case. Washington, D. C. Docket 4034 et al.

Sept. 16—Hearing in Nogales, Ariz., Service Case. Washington, D. C. Docket 5984.

Sept. 21—Hearing in Continental Air Lines Albuquerque-El Paso Renewal Case. Washington, D. C. Docket 5869 et al.

Sept. 28—Hearing in Ozark Air Lines Renewal Case. Washington, D. C. Docket 5988.

Oct. 6—Hearing in Bonanza Airlines Renewal Case. Washington, D. C. Docket 5773 et al.

Oct. 19—Hearing in New York-Chicago Service Case. Washington, D. C. Docket 986 et al.

Oct. 19—Hearing in Lake Central Airlines Acquisition Case. Washington, D. C. Docket 5770.

INTERNATIONAL AVIATION

Edited by Anthony Vandyk

INTERCOM

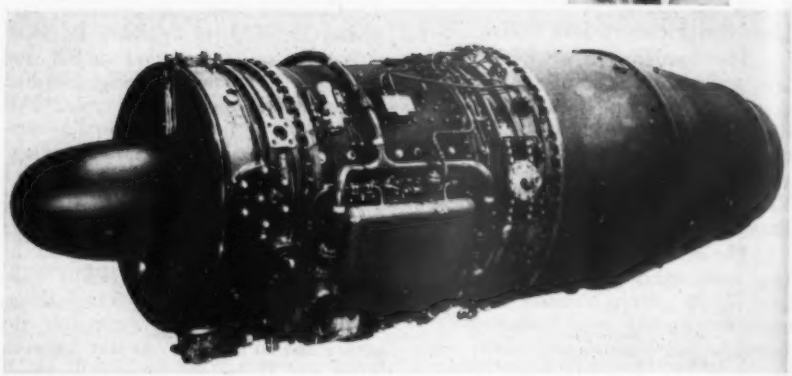
Price is often the most secret of a plane's "specs," even if it is not a military type. In all events the figure obviously depends on many factors: how many are being ordered, whether spares are included, whether the plane is being offered equipped, and whether a special "export price" is being quoted. Two countries—Britain and France— are particularly interested in "export price" deals, with payment made in such manner and at such time as the customer may desire. France, for instance, is reported to have sold 70 Dassault Ouragan jet fighters to India at a "pump priming" unit price $60,000 below the manufacturer's figure of $200,000. Similarly Brazilian airlines are stated to be getting Nord 2501 Noratlas transports from France at the below-cost figure of $365,000 each. Britain recently sold Brazil a batch of Gloster Meteor fighters in exchange for cotton.

• •

Wandering around the ramp at Le Bourget airport, Paris, we were able to get a close look at one of the Polish LOT airline Ilyushin Il-12's that regularly link the Polish and French capitals. Externally resembling a cross between a Convair 240 and a Saab Scandia, the Russian plane looks drab due to its brown protective finish. Two other superficial impressions—the very primitive four-blade propellers and the weak-looking nose-wheel gear. Other rare aircraft noted at Le Bourget included a batch of disused Convair C-87's (transport version of the B-24 Liberator) and two of French independent airline Aigle Azur's Boeing 307 Stratoliners.

• •

Britain's 32 independent airlines now have a total of almost 250 aircraft, including 41 four-engine Yorks, 35 DC-3's, and 25 Vikings. About a quarter of the total consists of de Havilland 89 Dragon Rapide twin-engine biplanes. Biggest of the independents is the Lancashire Aircraft Corporation/Skyways combine, which has 49 aircraft, including 28 Yorks. Perhaps the most active company is Silver City Airways, which specializes in carrying automobiles between England and Continental Europe: in the first four days of this month it carried 1013 cars, 830 motorcycles, 670 bicycles, and 131 motor scooters—together with over 6000 passengers—in the course of 585 crossings.



SNECMA Vulcain gas turbine which incorporates many lessons learned by the French company in the development of the Atar series of jet engines is shown above. Although still in the experimental stage the engine is already running at well over 10,000 pounds static thrust dry and at 13,000 pounds with water injection. Weight is 3080 pounds and overall diameter is 45½". The Vulcain is being fitted in a SE 2010 Armagnac four-engine transport for flight testing.

Pack Turns Bombers Into Jet Tankers

There is no longer any need to build special tanker aircraft for the in-flight refueling of bombers of the future, thanks to the development in Britain by Flight Refueling Ltd. of a system whereby standard jet bombers can be converted to tankers; a standard bomber also needs only minor modifications to turn it into a fuel receiver.

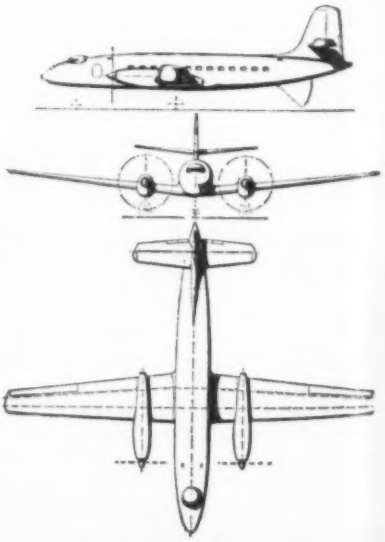
The RAF is currently testing the new conversion system, a "pack" consisting of a hose reel unit which is transported on a trolley similar to a standard bomb trolley and is simply hoisted up and hooked on to pre-installed connections in the bomb-bay (and removed just as simply when not required); special tankers have also been developed which can have packs in the wing tips as well as in the belly for the simultaneous refueling of three smaller aircraft.

Italy's Newest Transport

A new Italian twin-engine transport, which could be powered by either turboprop or Turbo-Compound engines, has been designed by F. Zappata under sponsorship of the Agusta company. Called the AZ.1, proposal calls for a conventional low wing monoplane with a wing span of 110 feet, length of 92 feet, and height of 30 feet. Wing area is about 2060 square feet.

Engines proposed for AZ.1 are turboprop Bristol Proteus 705's and Wright Turbo-Compounds. With the Proteus installation, empty weight would be 35,274 pounds and speed 405 mph. For Wright Turbo-Compound design, corresponding data would be 37,258 pounds and 385 mph speed.

Gross takeoff weight and payload for both engine arrangements call for 59,525 pounds of 11,023 pounds, respectively.



THREE-VIEW of the AZ.1

An Allison Technical School instructor leading class discussion on the J35 Turbo-Jet engine.

Training the men behind the men who fly the jets

Around the world there is an ever-growing fraternity of mechanics, engineers and instructors who have earned the title, "Allison Technical School Graduate." More than 10,000 members of the Air Force, Navy and Marines have received diplomas from the Allison Technical School, in Indianapolis.

Students selected by the Armed Forces are usually engineering officers or enlisted personnel with long years of service. They are sent to the school for intensive 4-week courses which involve long hours in the classrooms and extra hours of homework every evening.

Skilled Allison instructors with many years of varied experience make use of modern teaching aids including cutaways of J33 and J35 Turbo-Jet engines, the T38 and T40 Turbo-Prop engines.

But the activities of the Allison Technical School do not stop with the classes at Indianapolis. In addition, Allison instructors from the school go out all over the world to set up classrooms at air bases and aircraft manufacturing plants to teach thousands of other technicians the proper methods of operating and maintaining Allison turbine engines. These men include pilots, flight engineers and technicians from aircraft builders and our own organization.

Yes, thousands of the men behind the men who fly the jets proudly wear the badge, "Allison Technical School Graduate."

GM GENERAL MOTORS

Allison DIVISION OF GENERAL MOTORS, INDIANAPOLIS, INDIANA

World's most experienced designer and builder of aircraft turbine engines—J35 and J71 Axial, J33 Centrifugal Turbo-Jet engines, T38 and T40 Turbo-Prop engines

INTERNATIONAL AVIATION

MANUFACTURING

• **BRITAIN:** Prototype Avro Vulcan bomber now has Sapphire instead of Avon engines. Production aircraft will use the Olympus.

Inclinometer for measuring Comet take-off angle has been developed by Britain's Kelvin & Hughes, Ltd. Instrument registers on the pilot's panel the degrees the nose is off the ground. Flight tests are reported to be successful.

First application of de Havilland's 20,000-pound-thrust Gyron will be in a supersonic fighter. Engine was developed as a private venture but is now government-sponsored.

• **JAPAN: Legislation to provide financial assistance for the Japanese aircraft industry is now being drafted. As an interim measure the Japanese Industry Rehabilitation and Development Bank is to make loans totalling some $1,700,000 to selected firms.**

• **FRANCE:** Breguet is developing a light twin-engine (Potez 220 or 240 hp) transport known as the PA 400 Lucane: gross, 3924 pounds; payload, 2469 pounds; max. speed 230 mph; cruising speed, 185 mph.

Two more SIPA 200 Minijet light planes are to be built.

First Fouga 170R Magister jet trainer with normal (instead of butterfly) tail has started its flight test program.

• **GERMANY:** Messerschmitt has registered an aircraft production company in Essen; firm has no factory, merely an office in a former Krupp building.

Borgward automobile plant is interested in building aircraft.

Volkswagen automobile concern is reported to be backing a program for the manufacture of two "people's aircraft"—a single-engine and a twin-engine model—at the Behr plant at Springe am Deister; planes would be built of wood and mass-produced to sell very cheaply.

Aviation research is being conducted by the Brunswick Institute of Technology under a program backed by the Henschel company and the West German government.

TRANSPORT

• **EUROPE:** Air France made a profit equivalent to about $315,650 for 1952, over double the 1951 net. Load factors averaged 74% (against 72%) and revenue was up 24.5%, mainly due to increased traffic on the North Atlantic, where the airline carried 45% more passengers than in 1951.

KLM Royal Dutch Airlines made a profit of $1,500,000 in 1952, enabling the company to repay the remainder of the $2,650,000 loan made by the Dutch government in 1950.

Ireland's Aer Lingus airline incurred a net loss of $240,000 for its fiscal year through March 31, 1953, against a profit of $260,000 for the previous year. Greatly increased costs (notably in payroll items), the U. S. oil strike, and an "unprecedented spell" of foggy weather were the main reasons for the loss.

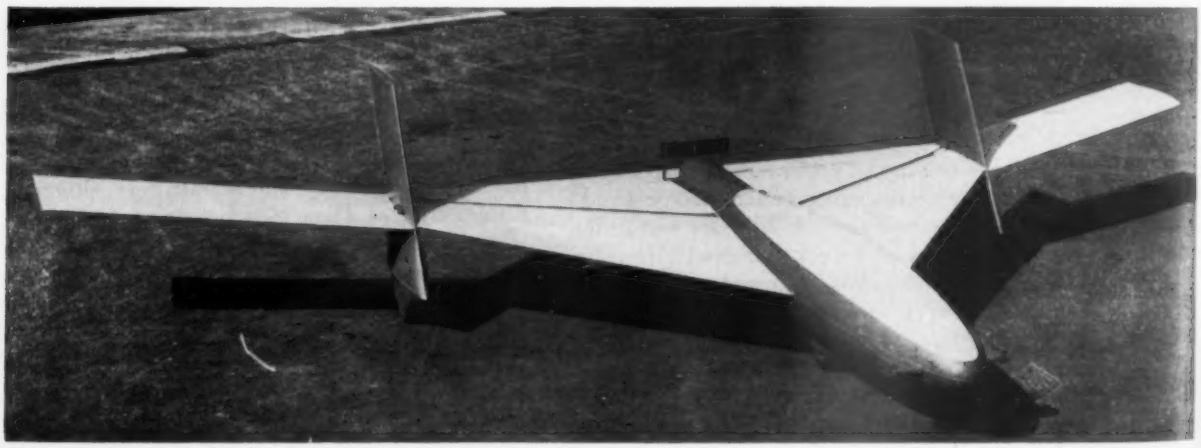
• **BRAZIL: Early in 1954 Brazilian airline UASP will get the first of four additional SAAB Scandias built under license in the Netherlands by Fokker.**

MILITARY

• **SPAIN: Spanish navy has decided to order three Bell helicopters and it is possible that an additional nine machines will be ordered. Ten different companies bid for the order and Bell Aircraft Corp. won out.**

• **AFRICA:** The Southern Rhodesian government is to re-equip its air force with Percival Provost basic trainers and Pembroke communications aircraft.

• **AUSTRALIA: RAAF has ordered two electronic flight simulators for the training of Avon-Sabre pilots.**



"Semi-expendable," 25-foot target built by Britain's Air Service Training Ltd. (a component of the Hawker Siddeley Group) is now being flight tested. It is designed to be towed at very high speeds to give supersonic-class fighter pilots gunnery practice. Construction is unusual, featuring an all-metal stressed skin filled with a plastic resin instead of the normal structural members. A tail parachute is used for landing.

serving the U. S. Navy...

Marquette WINDSHIELD WIPERS

Lockheed P2V Patrol Bomber equipped with Marquette Wipers

The Marquette
METAL PRODUCTS CO.
CLEVELAND 10, ONIO
SUBSIDIARY OF CURTISS-WRIGHT CORPORATION

Also Manufacturers of:
ROLLER BEARING TEXTILE SPINDLES
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the bulletin board

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Displayed Advertising: $10.00 per inch for less than 15 inches in one issue or in any 12-month period. For more than 15 inches, $8.50 per inch; more than 30 inches, $8.00; more than 60 inches, $7.50; more than 90 inches, $7.00; more than 120 inches, $6.50. Space units up to full pages accepted in this section for classified-type advertising.

Forms close 20 days preceding publication date. Address all correspondence to Classified Advertising Department, AMERICAN AVIATION PUBLICATIONS, 1025 Vermont Ave., N. W., Washington 5, D. C.

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LAMBERT FIELD INC. ST. LOUIS, MO.

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P&W R **1830-92** Into **1830-SUPER-92**

ONLY **$5500** with all new cylinders, pistons, pins, rings, etc.

20°-40° Cooler Running

700 HP Easy Cruise
Safer Single Engine
Less Fuel per Mile
Lower Maintenance Costs

Write or call CAbany 5428

D-18-S TWIN BEECH

N-5869C, SERIAL NO. A-570

Total Airframe Time 1295:00

Engines:
Left ..... 780:30 TSO
Right ..... 277:25 TSO

Propellers:—Hamilton Standard Full Feathering Hydromatic
Left 277:25
Right 277:25

Special Equipment:—Anti-icing and de-icing equipment, Auxiliary Tank (80-gallon), Windshield Wipers, Flares, "No Smoking"—"Fasten Seat Belt" signs, Special factory paint—Pearl grey and yellow with white stripe, Heavy duty tail wheel tire & tubes, Two spare zero time engines.

Aircraft Interior:—3 chairs and lounge, 1 card table, Grey ladder-weave with solid green headliner, 2 Thermoses.

Radio Equipment:—Lear Auto Pilot, Bendix ADF, Bendix MN-85 Omni Receiver and 280 Channels Crystal control, ARC-1 20 Channels Transceiver, Glide Path Receiver, Western Electric 3-light visual and audio marker receiver, ARC 5 Channel Transmitter, Isolation Amplifier, Custom RAS Overhead Control Panel, ARC Command Receiver, Dual Gyro Panel.

Aircraft Exceptionally Well-Maintained. One Corporation Owner.

Reason for Selling: Replacing with De Havilland "Dove."

AVAILABLE AFTER SEPTEMBER 1, 1953.

ASKING PRICE: $75,000

D-18-S TWIN BEECH

N-48Y, SERIAL NO. A-173

Total Airframe Time 2900:00

Engines: ..... P & W R-985
Left ..... 600:00 TSOH
Right ..... 235:00 TSOH
One spare zero time engine.

Propellers:—Hamilton Standard Full Feathering.

Interior:
5 chairs (all reversible)
1 card table
Completely sound insulated
Green interior fabric including crew compartment
Curtains

Special Equipment:
Windshield wipers
Control locks
Liquid dispenser
"No Smoking" sign
80 gallon Nose Tank

Radio Equipment:
ARC-15 Omni
Low Freq. Transmitter & Receiver
3105 Command Transmitter
VHF Transmitter (ARC)

Airplane Exterior:
Painted light green with dark green trim, white piping, white cabin top.

Aircraft Exceptionally Well-Maintained. One Corporation Owner.

ASKING PRICE: $47,000

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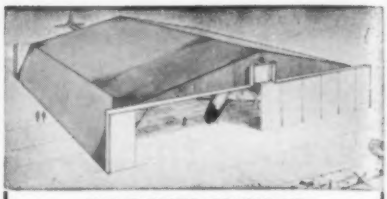

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Best equipped in U. S.

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Bendix MN 85 VHF Receiver, 280 ch.
Bendix NA-3 Navigation system, with Omni-Mag. R.M.I.
Bendix MN31C ADF, Dual
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C18S and D18S Transports—Excellent Condition fully equipped from $25,000

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Why take less for your money?
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We Invite Inquiries for Any Types

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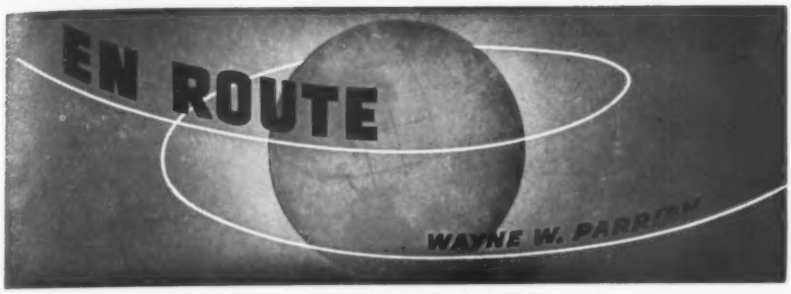


Sunday in Paris. It all started out so innocently. Know what I mean? But Lordy how things do seem to happen in this aviation business.

You see how it was. A quiet Sunday in Paris. Just pleasantly warm. After reading the London papers I went with some airline friends for a fine dinner in the garden of a small family restaurant off on a side road west of Versailles. The wine was good, so was the atmosphere.

So then we stopped by the apartment of some more airline friends and had a drink. Just pleasantly social, know what I mean?

Then as the sun was going down I was due at the apartment of **Bob Kinkead,** Republic Aviation's top man in Europe, for a nice quiet family dinner. Know what I mean—just nice and social. Dinner was fine. So were the drinks, the wine and the liqueurs.

Lots of Eves. I could have gone home to bed, you know how it is, but somehow or other I ended up at a night spot in Montmartre where all they drink is champagne—I think the joint was called *La Nouvelle Eve* and it was a typical undress display with lavish stage settings as far as I can remember—and somehow or other I got back to my hotel at 4 o'clock in the morning just as it started to get light.

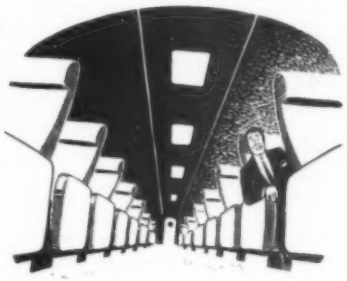
Now that was okey, you know how it is, except that I was to leave on Air France for Tangier on the northwest tip of Africa at 8:35 a.m. I remember distinctly waking up the concierge of the hotel—the Royal Monceau—and leaving a call for 6:30 a.m. After all, I could use a couple of hours sleep.

At 7:05 my telephone rang and the concierge (which is a high class French word for porter) said my car was waiting. I awoke very fast at that point. Car? Yes, but what happened to my 6:30 call? I wasn't shaved or packed. I have to catch a plane. Just a moment, he said. Then the hotel operator got on the phone and said "I'm so sorry, monsieur. You were supposed to be called at 6:30. It is my fault."

Hold the Car. So what can you do at that point? Waste time arguing? No use doing that. "Just hold the car until I can get ready," I said.

So in nothing flat I shaved, threw my belongings into my bag, and dashed downstairs, signed my bill, and got into the car which TWA had provided for me. The Royal Monceau is a first class hotel. But forgetting to wake up the patrons is a cardinal sin. All of the help on duty must have expected me to blow my top; I've never seen French hotel help so humble and not putting out their hands for tips. Not this time. But I didn't blow my top. Bless the hotel operator for admitting a mistake was made—I'd rather have it that way than a lot of denials.

Out to Orly airport bucking rush-hour inbound traffic—buses, bicycles, trucks and cars en masse. Arrived at Orly about five or ten minutes after eight, which still seemed like plenty of time to make my flight. No porters around. No passengers, either. I grabbed my bag and dashed to the Air France ticket counter. They seemed a little surprised to see me. The girl and guy on duty had a conversation in French so rapid that I couldn't catch the drift.



Into the Pen. Then a decision was made to check me in. I assumed that I was merely late but I could still get on the plane. The Air France gal took me hurriedly to customs. No customs man in sight. No passengers, either. But she dug up a customs bird and he cleared my bag. Then I went to the police and got cleared there. Then to immigration and then to health. At that point I was put into the out-going bullpen, a dusty room next to the ramp, with worn-out chairs and sofas. But no passengers. I was told to wait.

Although I was going to Tangier, my first destination was actually Casablanca, from which point I had to double back an hour to Tangier. So I was waiting for the Casablanca flight.

No sooner had the Air France gal disappeared than the health officer dashed in, as if with an after-thought, and said "Casablanca?" I said "oui" and he mumbled something and waved me to rush with him. Outside on the ramp we went, half-running, and to the south end of the building. The health guy, who had suddenly become my patron saint, director of traffic, guide, and major domo of the airport, yelled to some AF people standing by the side of a DC-4 with four props whirling. The steps had been pulled away and the airplane was ready to taxi out.

French Crisis. Obviously this was a crisis, and I was a little piece of paper caught helplessly and innocently in a French whirlwind. Me, you understand, with no hat or coat, an SAS overnight bag, a champagne head, a ticket for Casablanca five hours away down in Africa, and no breakfast.

The agents, at first excited when the health officer rushed up with me, took a look at my ticket, confirmed that my name was Parrish, calmed down, and told me to return to my bullpen. This wasn't my plane.

The health officer, whose chance for heroism and immortality was suddenly crushed, shrugged his shoulders in resignation. He had tried his best. He wanted to be an important cog. No soap. So back we trudged to my dusty bullpen, he to check people's health and me to wait.

It was still 15 minutes before plane departure time, at least by my watch. So I left my bag on a chair, dashed upstairs to the transient lounge—the only place I was allowed to go—and sure enough the bar was open and I got a cup of cafe au lait (coffee with hot milk, to you illiterate peasants), and a nice fresh croissant, gulped both down fast, and ran back to my bullpen. But still no passengers, no sign of activity.

How About Me? So I waited. After awhile I wanted to go out and buy a newspaper, but I couldn't leave the bullpen once I had been cleared. But the health officer took my francs, bought a *Herald Tribune* for me, and I read the morning news leisurely. Time passed. Still no passengers and no plane. Once an Air France guy came through my bullpen and I said "Hey, how about me?" Oh, he said, where are you going? Casablanca, I said, holding out my ticket. Oh, he said, I'll have to check on that. I never saw him again.

Pretty soon some passengers began to arrive in my bullpen. Ah, I thought, now some action. Then a flight was called for Madrid and all my new-found companions filed out to the ramp and boarded their plane for Spain and I was again left alone.

In about an hour and a half, by which time I began wondering how long this was going to keep up, an Air France gal came through my bullpen and again I yelled out in my perfect French, "Hey, how about me?" Where are you going, she says. Casablanca, I replied. "Oh, you have a long wait," she said. "But why," I said, "here is my ticket. I'm checked in." "I'll find out," she said, and disappeared—for good.

At Last. Exactly two hours and three readings of my paper later at 10:30, an Air France agent walks into my bullpen, all smiles, and says, "Mr. Parrish, your plane is now ready."

"Oh," I said, "that's just fine." I got up and started with him to the door. "But where are the other passengers?"

He said something about there having been some engine trouble on the airplane and the other passengers had been put on another flight, but I never did find out whether they had already gone ahead or whether they were still at the downtown terminal and were being sent out later.

"How about my bag" I said, as we walked out toward a Constellation.

"I put that on myself," he said.

"But aren't there any other passengers?" I asked plaintively.

"No, you are the only passenger."

Off to Casa. Phew! Well, you know me, I take things as they come

and I'm never surprised at anything any more, so I walk like a king up the steps and am welcomed by a purser and a steward and am told I can take any one of the 59 seats that suits my fancy.

"You sure this plane is going to Casablanca?" I ask in as strong a voice as I can muster in one last, final desperate effort to find out what in the hell cooks.

"Oh yes, direct to Casablanca."

So that's it. I take a seat, fasten my seat belt, the door is closed, the engines start, we taxi out to the runway, and take off in the mid-morning sunshine for, I hope, Casablanca.

This is one fine damn airline, I say to myself. What other airline in the world provides 59-seat Constellations for individual passengers? The steward puts on his white jacket and asks me if I'm ready for breakfast. A very good breakfast, too. The purser comes around to ask what he can do for me. The steward asks if I've had enough to eat. I've never been treated so royally.

Service for a King. The hours pass. The French farms far below are picturesque. We pass over Bordeaux, then skim by the Pyrenees and are over arid Spain. There's Madrid far below, then Toledo. and then the steward asks me when I'd like my lunch.

Well, says I, wanting to make the most of my new luxury and wondering how long this has been going on, serve me lunch anytime you're ready. So I have a fine luncheon with wine. We pass over Seville, then Cadiz, and then we're out off the coast of Africa, and pretty soon we come in for a smooth landing at Casablanca.

My Connie pulls up before the terminal, the airport and airline functionaries are lined up on the ramp, the steps are pulled up, the door opens, and I walk down into the Moroccan sunshine with as much dignity and savoir faire as the occasion seemed to demand.

So that's how I got to Casablanca. And I don't want to hear any more nonsense from you unwashed heathens about Air France passenger service. Ain't nobody can touch it anywhere. But I'd sure like to know whatever happened to those other passengers.

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in south america

Braniff does make the difference

Mr. Anthony M. Dente of Wellesley Travel Service (center) gets his ticket and a hearty "bon voyage" from Braniff's Boston Manager, George Braender (right), as Wellesley Travel's President, Charles E. Heartfield looks on (left).

We have it straight from expert Anthony M. Dente, foreign manager of Wellesley Travel Service. He's just back from flying round South America with us. And we quote:

"While distances between the interesting centers of South America may appall the average traveler as he views them on a map, they are actually mere 'hops' on the excellent services of Braniff International Airways' El Conquistador.

"Braniff's South American personnel have the easy, Old World talent of making the passenger feel perfectly at ease—even as they point out attractions of unusual and exotic interest en route, such as the Rio Grande do Sul and the towering peaks of the Andes.

"One has merely to relax in his chair, the eyes soothed by the intelligent use of colorful murals painted on the walls of the cockpit ahead, and the wonderful cooperation of flight and service crews carries the passenger from airport to airport, over mountains and forests, in a style truly befitting a Conquistador."

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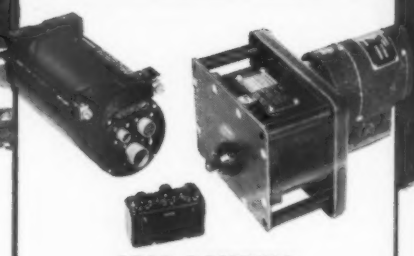
In jet fighters, bombers, transports and airliners Lear Control and Actuating Systems and Components are making flight smoother, faster, more economical —and safer.



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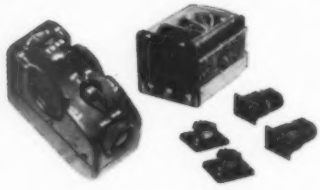

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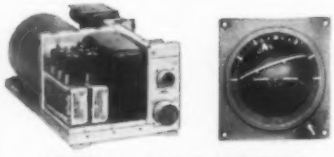

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News at Deadline

Lufthansa to Fly U. S. Equipment Next Spring

Germany's Deutsche Lufthansa airline will resume operations within Europe and to Cairo next spring and will fly to North and South America a year later, an official West German government announcement reveals.

Four Convair 340's and four Lockheed Super Constellations will be used. The Convairs will be used to inaugurate services from Germany to Paris, London, Rome, and Cairo.

The aircraft will be probably based at Hamburg and will also serve Frankfurt, Dusseldorf, and Munich (and possibly later Cologne-Bonn). Choice of base lies between Hamburg and Munich, but former is considered more suitable by the federal Transport Ministry, since its lower altitude above sea level would be better for jet transports.

The Transport Ministry states that the jetliners available for delivery now "still have so many drawbacks and are so limited in range that they are not considered practicable for the Atlantic routes," and points out that the Super Connies are adaptable to turbine power.

The Lufthansa eight-plane fleet is much smaller than first planned. Originally, the official German announcement states, 24 aircraft (12 Convairs and 12 Super Connies) were to have been ordered, a quantity which "would have been the most favorable economically." The necessary capital could not be found, however, because "an American $25 million credit could not be realized."

Airline Heads Hit Non-Sked Report

New attacks on the recent report of the Senate Small Business Committee, which recommended a larger scope for the irregular carriers (see page 15), have come from the presidents of four major scheduled airlines.

• **W. A. Patterson** (UAL) asserted that the "committee appears to condone those among the irregulars who are in business only because of their deliberate, wilful, and continuing violation of the law."

• **E. V. Rickenbacker** (EAL) branded the irregulars as "opportunists who entered the industry under exemptions from the standard regulations . . . who have . . . disregarded the limitations of these regulations; and who . . . scream 'Small Business' whenever the CAB attempts to enforce provisions of the law."

• **Harold R. Harris** (NWA) wrote that "the principal irregular combine, known as North American Airlines, is not small business."

• **C. R. Smith** (AA) said that the report, like others before it, belabors the policy and diligence of the Board, and unnecessarily so."

Air France Orders Three Comet II's

An order for three de Havilland comet II's has been placed by Air France, according to the manufacturer, which reports that the carrier is interested in the Comet III. Air France jet service starts on August 17 between Paris and Beirut, using Comet IA's.

Rickenbacker New EAL Board Chairman

E. V. Rickenbacker has become chairman of Eastern Air Lines' board of directors and vacated the role of president in favor of Thomas F. Armstrong, secretary-treasurer of EAL since 1938. Rickenbacker will continue to serve as chief executive officer and general manager.

The move highlighted top-level shifts centered around Armstrong's election to the presidency. Thomas E. Creighton, assistant secretary, succeeds Armstrong as treasurer and Floyd Farley, assistant treasurer, succeeds Armstrong as secretary. Creighton was also named to EAL's board of directors.

Rickenbacker, who has headed EAL since 1938, said the company plans to give its young men more responsibility all along the line and that he himself will devote more time to policy matters and long-range planning. Prior to his election to the post today, Eastern had no specifically-designated board chairman.

KLM Flies DC-6A

Scheduled all-cargo service with a DC-6A Liftmaster has been instituted by KLM on one of two weekly cargo flights between Amsterdam and New York. A second DC-6A will be delivered in the fall, whereupon DC-4 equipment will be withdrawn from the North Atlantic cargo service.

Senate Group Outlines Civil Aviation Study

Problems that may receive the attention of the Interstate and Foreign Commerce Committee's subcommittee on civil aviation have been outlined in a letter by Sen. John Sherman Cooper (R., Ky.), chairman of the group.

Among the topics to be considered:

• **Monopoly and competition:** How to achieve a middle ground, if possible; how the public is affected; how the regulatory agency should act.

• **Administration of the Civil Aeronautics Act:** "Ascertaining the extent to which the spirit and intent of the Act has been . . . fostered."

• **Right of entry into the industry:** Charges of alleged CAB discrimination against the irregular carriers "should certainly receive the attention of this subcommittee."

• **Airline profits and subsidies,** level of passenger and freight rates, and the national standing in the international field.

German Industry Group Formed

Formation of an association of several of the more important German aircraft firms has been announced. Purpose of the group, to be known as Aero-Union, will be to make the best possible use of available facilities by pooling both production equipment and technical information. Members are Dornier, Focke Wulf, Heinkel, Messerschmitt, and Daimler-Benz.

Aero-Union's president is Dr. Claudius Dornier, and vice president is Dr. Nallinger of Daimler-Benz.

Fatality-Free Year For International Lines

A full year of operation without a passenger fatality was completed on July 28, 1953, by the U. S. scheduled international airlines, according to the Air Transport Association. During that period the airlines carried an estimated 2.5 million passengers some 3.3 billion passenger-miles.

Seven times previously the international carriers had completed a 12-month period without a passenger fatality, the longest of which extended to 28 months and 16 days.

NWA to Lease DC-6A's From FTL for 7 Years

In a move to ease its equipment shortage, Northwest Airlines will lease four DC-6A's from The Flying Tiger Line for a period of seven years at $26,071 rental per month per plane. Planes will be converted to 76-passenger (two-abreast) coach DC-6B's and will first go into service between the Pacific Northwest and Honolulu.

Planes will be third, fourth, fifth, and seventh to be delivered to FTL by Douglas, first three scheduled for next month, and fourth for March, 1954. FTL is to stand conversion expense. NWA can extend the lease on any or all planes for three periods of one year each at $10,000 per plane per month. Company has six Lockheed Turbo-Compound Super Constellations on order, but the first will not be delivered until November, 1954.

Investment Firm Name Changed to Resort

The investment firm which now holds 78% of the stock of Resort Airlines, Fiduciary Management, Inc., has voted to change its name to Resort Airlines, Inc., with a view toward eventually combining the two firms. At present the investment firm is incorporated in Delaware, while the airline is a North Carolina corporation.

Fiduciary has 99% of its investments in Resort. Although permitted by its charter to invest in other fields, it will continue the policy of investing almost exclusively in the airline. Such future investments are expected to make it possible for Resort to discontinue its practice of leasing aircraft and buy equipment instead.

Plane Sales to Hit $6 Billion in '53: NCO

Plane manufacturers are expected to reach sales of six billion dollars in 1953, according to the Metals Division of the National Credit Office. At this production rate the aircraft industry has a two-year backlog, observes the NCO, "none too generous when it is realized that as many as 30 months may intervene between the design and production of a new plane."

Plant expansions have so reduced the amount of working capital that little more than one month's sales could be financed by it, compared to three months two years ago. As a result, dividends have not increased, despite substantially higher profits.

IAM Members May Reject Agreements

Unexpected difficulties are delaying approval of contracts recently negotiated between the IAM-AFL and six airlines. A special meeting of IAM's general chairmen on Eastern, United, TWA, Northwest, Capital, and National Airlines was set for August 13 and 14, following informal turndowns from some groups of IAM members.

If IAM members on one line should refuse to ratify the negotiations, the entire joint bargaining agreement would presumably be voided if the remaining carriers wished.

Adm. Towers to Head Flight Safety

New president of the Flight Safety Foundation is Adm. John H. Towers (U.S.N., Ret.) who has been a consultant to Pan American World Airways since his retirement in 1950 from his post as vice president of the line.

He will devote full time to the administrative direction of the organization, leaving managing director Jerome Lederer "greater opportunity to devote his experience and abilities to the direct safety work."

American Hits EAL Service in Texas

American Airlines hit back at Eastern Air Lines' proposal to serve Dallas recently, disclaiming statements that there is an emergency in Dallas resulting from services switched recently to the new Ft. Worth International Airport.

Claiming Eastern should look to providing more adequate service for its own cities, AA indicated it currently provides Dallas with 19 daily flights with four-engine equipment between Love Field and New York, and 11 more between Ft. Worth and New York, for a total of 1672 daily seats. It noted that Eastern at Houston, for example, provides only 10 flights daily.

Further, said AA, "Dallas passengers flying on American pay standard fare for standard service and tourist fares for tourist service. On the other hand, when riding on EAL's Constellations, the people of Houston must pay standard fare for 5-abreast seating (which type of service is provided by American only on tourist flights at tourist fares). This is, of course, Eastern's regular practice on all its routes. In 1952, 69.4% of all of Eastern's domestic system standard fare service was provided in high-density, 5-abreast seating, coach-type airplanes."

Convair Turboprop Version Planned

Consolidated Vultee, which recently obtained USAF contracts to convert 2 of its Convair 340's to turboprop power, is planning to offer Convair-Liners powered by Allison T56 engines rated at 3750 hp by late 1955 or early 1956. By this time Allison expects to have its T56's certificated by the CAA.

The T56, a more powerful version of the T38 which has been flying in the Convair Turboliner, probably will begin flying service commercially with a 400-hour allowable interval between overhauls.

C-130 to Cost Four Cents/Ton-Mile: Gross

Cargo service for four cents a ton-mile is predicted for the Lockheed C-130 by Robert E. Gross, the firm's president, in an article printed in the August issue of *The Atlantic* magazine. While not identifying the aircraft specifically, Gross makes it clear that he refers to the C-130.

Cost of between $1½ to $2 million per aircraft is a possibility, says Gross, if line production of 50 planes a year can be obtained. Prototype would cost $40 million. Although military contracts make the date of the C-130's commercial use uncertain, its eventual use, Gross held, would be certain.

JAL To Take Delivery On FTL DC-6A's

Japan Air Lines will pay the Flying Tiger Line $1,200,000 (plus $250,000 which the Tigers had paid to the Douglas Aircraft Co. as a deposit) for the delivery rights on two DC-6A's. The planes will be converted to DC-6B configurations before the deliveries, which are scheduled for mid-August and the end of September.

Two DC-6B's previously ordered by the Japanese line will go to the Tigers when they are ready for delivery in December, 1954, and January, 1955. These will be converted to DC-6A's before delivery.

Canada-Mexico Service to Start

Service from eastern Canada to Mexico will be started soon by Trans-Canada Air Lines, following the recent signing of a bilateral air transport agreement between Canada and Mexico. Operations will be begun between Vancouver and Mexico City by Canadian Pacific Airlines on September 25.

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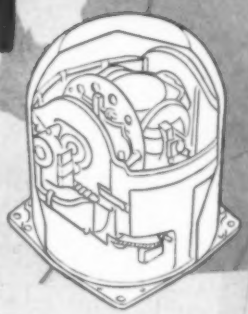
Eclipse-Pioneer's "Polar Path" system guided the first commercial over-the-Pole flight* with such accuracy that the log of the now-famous Scandinavian Airlines System's flight carried the notation "works to a miracle". How was it possible to produce this gyro that actually proved to have less than 1° random drift? Admittedly, it was a special gyro, but the answer nevertheless lies in advanced production techniques and facilities that are pushing gyroscope precision toward perfection. Today, *even machining* of gyro parts is being accomplished at E-P in a specially constructed, atmosphere-controlled room where castings "soak" for 36 hours to assure stability of carefully machined tolerances—where electronic air cleaners snatch up foreign particles so fatal to delicate mechanisms—where specially constructed machines automatically hold split-hair tolerances as a matter of routine and surface finishes are maintained to the incredible limits of the thickness of a single light band. In the entire industry, only Eclipse-Pioneer can offer precision mass-production facilities like these—facilities that literally are pushing gyro precision toward perfection.

*NOVEMBER 20, 1952



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PHILLIPS Petroleum Company sponsored many of Wiley Post's experimental stratosphere flights during the mid-thirties. For his high flying, a rubberized fabric "space suit" was used by Post to protect him from the dangerous effects of high altitudes. Shown here are Post (left) and Will D. Parker, Manager of Phillips Petroleum Company's Aviation Division, standing beside Post's plane "The Winnie Mae," examining the inflated suit in preparation for one of the high altitude flights. On the extreme right is Guy Ball, parachute expert.

THE LATEST high altitude pressure suit, shown above, was developed for the U. S. Navy by B. F. Goodrich Company. For the first time pilots can now abandon jet or rocket aircraft in outer space atmospheres. Life can be safeguarded as high as 100,000 feet in the new high altitude suit, designed to inflate automatically to survival pressures should a plane's pressurized system fail. This innovation in outer space attire stems directly from that first "space suit" worn by Wiley Post—and made for him by B. F. Goodrich.

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